ADVANCED BURNER TECHNOLOGIES

P.O. Box 410, 271 Route 202/206
Pluckemin, NJ 07978
Phone: 908-470-0470; FAX: 908-470-0479

Opti-Flow™ Low NO_X Burner
Operating Instructions

For

Elbow Burner

OPERATING INSTRUCTIONS FOR THE OPTI-FLOW™ LOW NO_X BURNER

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IP7_030220

OPERATING INSTRUCTIONS FOR THE OPTI-FLOW™ LOW NO_X BURNER

1.0 INTRODUCTION

A burner mixes pulverized coal and air together to produce a controlled flame. The concept is simple, in practice, it is very difficult to achieve complete combustion (low LOI), meet emission requirements (low CO and NOX), flame stability, as well minimizing side effects such as slagging, fouling and burner eyebrows all at the same time. The ABT Opti-Flow Burner can achieve all of these goals, if the correct design information was provided, and the burner is set up by experienced technicians.

The single most critical item is to have the correct proportions of air and fuel at each burner. Each burner must have the correct ratio of fuel to air. This is achieved by balancing the coal conduits so that each line has the same coal flow and adjusting the secondary air control sleeve dampers to provide sufficient airflow to each register. The other adjustments on the Opti-Flow Burner control flame stability and emissions.

The inlet side (fuel) of the burner consists of a "Flat-back Elbow" with Patented flow distributors to break the coal "rope" up and distribute the coal evenly across the cross section of the inlet to the burner. Internally there is an adjustable sliding tip that varies the outlet area of the coal tip within the patented Opti-Flow coal nozzle.

The secondary air side consists of a sleeve damper, perforated plate, outer air zone spin vanes, inner air zone spinner, inner air sleeve damper, and stabilizer vanes on the coal nozzle.

See ABT drawing _____, for a pictorial representation of the burner and its components.

2.0 PHILOSOPHY AND INITIAL SETTINGS OPTI-FLOW™ LOW NOx BURNER

2.1 General

To effectively compensate for the variations in airflow and differences in coal properties, the OPTI-FLOW™ LOW NOx BURNER was designed to have more adjustments than the original burner. It is important to understand the effects of these adjustments and the theory of the burner before attempting to change any of the settings or to tune the burner.

2.2 Flow Philosophy

A pulverized coal/primary air mixture, supplied from a coal pulverizer, is introduced to the fuel injector. The fuel injector's internal flow distribution devices provide a uniform distribution of pulverized coal exiting the Opti-Flow nozzle. By optimizing the axial position of the inner barrel's tip, the best NO_x level and flame shape can be obtained. The positions of the inner register vanes and outer register swirl are also critical to flame shaping.

The secondary air enters the fuel injector through the Secondary air damper (SAD) which is equipped with an electrical motor driven unit to control the total amount of secondary air each fuel injector receives. The secondary air register arrangement enables a division of the secondary air stream into two concentric streams through use of an adjustable inner air flow damper. This in turn provides an inner and outer secondary air annulus within the dual air register.

2.3 Dual Secondary Air Registers

As aforementioned the secondary air dual air register arrangement provides a method to divide the secondary air stream into two concentric streams. By utilizing the inner flow damper, airflow can be proportioned between the inner and outer secondary air annulus. The outer air register and inner fixed vane assembly are adjusted to optimize the flame shape and position. These vanes are designed to impart a rotational motion to the secondary air. The settings are determined during the initial burner optimization and are not modulated thereafter. The inner burner barrel provides a pathway for tertiary air required to keep the barrel free of ash buildup or to supply combustion air for an oil or gas igniter if mounted internally within the inner barrel.

a. **Secondary Air Control Sleeve Damper** The sleeve damper (SAD) is the main airflow control device on the burner assembly. This damper has settings of closed, light off and open positions. During the initial full load burner optimization, adjustment of the outer sleeve (SAD) damper is made to achieve the best possible O2 distribution across the furnace. Once this is accomplished the open position is not normally changed during burner operation. (This with exception to light off and closed positions during start - up and shut down)
A perforated plate, installed around the circumference of the secondary air register inlet area, aids in the burner circumferential air distribution. The result of this air distribution improvement is better airflow control through the air register assembly and into the flame zone. The perforated plate is a nonadjustable item.

b. **Outer Air Register Spin Vanes** The outer register spin vanes direct the secondary air stream to enter the furnace in a more axial direction (and with a lesser degree of swirl) than the secondary air passing through the inner air register. This air stream then combines with the reducing atmosphere flame zone approximately two (2) throat diameters into the furnace to provide the remaining air necessary for combustion within this flame zone. The swirl on the secondary air stream promotes sufficient mixing of the two streams to ensure adequate fuel burnout prior to exiting the flame zone.

The outer register is initially set at a nominal 40% open position however; the normal range is found to be between 25 to 65% open. During initial burner optimization, the outer air register position will be fine tuned to produce minimum NOx and a balanced O2 and CO distribution across the economizer exit flue. Qualified personnel should only perform adjustments to the outer air register vane position.

c. **Inner Air Sleeve Damper** The inner air register regulates the amount of air imparted to the fuel/air mixture in the near-throat area. Working in conjunction with the primary air velocity to control the point of ignition directly in front of the burner nozzle. The inner air sleeve damper is initially set at a nominal 20% open position however; the normal range is from zero to 40% open. During initial burner optimization the inner air register (damper) position will be fine-tuned to optimize the stability of the flame.

d. **Fixed Vane Swirler** The Fixed Vane Swirler utilizes the air coming through the inner register into the inner zone to control the spinning or turbulence of the inner zone air traveling over and around the stabilizer bars located at the burner tip. Developing the correct amount of turbulence will stabilize the flame, allowing for a strong flame root to develop. This stabilization is necessary to achieve the best possible NOx, CO and UBC reduction.

NOTE

ALL BURNER ADJUSTMENTS ARE, TO VARYING DEGREES, DEPENDENT UPON ONE ANOTHER. FOR EXAMPLE, CHANGING THE POSITION OF AN OUTER AIR REGISTER CAN AFFECT THE CO PROFILE. AS A RESULT, BURNER ADJUSTMENTS SHOULD BE DONE SLOWLY AND ONLY BY QUALIFIED PERSONNEL AWARE OF THE POTENTIAL RESULTS OF SUCH MANIPULATION.

2.4 Outer Burner Barrel

The OBB and the burner's coal nozzle forms the discharge nozzle through which the coal/primary air mixture flows. Attached to the discharge section of the outer sleeve is a segmented nozzle which channels the coal/primary air mixture into concentrated inner and outer streams and develops coaxial flame zones.

Uniform distribution of coal about the periphery of the coal nozzle's annular passageway is attained by use of patented flow distribution devices in the "Flat Back" elbow.

The chief design feature of the Opti-Flow nozzle is to control the mixing between the coal/primary air mixture and the secondary air stream. The combination of the concentrated coal streams and the staged secondary air produces near throat flame stoichiometries in the 60-70% range up to about two throat diameters into the furnace (the total burner, however, is operating at normal boiler excess air). At that point, the swirling secondary stream from the outer portion of the throat annulus, containing the remaining combustion air, combines with the flames and provides sufficient mixing to ensure adequate fuel burnout in the zone.

The result of partitioning the coal stream is that the volatiles in the coal are driven out and burned under a more reducing atmosphere than would occur without the Opti-Flow coal nozzle. The coal volatiles contain a high percentage of the fuel bound nitrogen that, when burned in an oxidizing atmosphere, would be converted to NOx. The Opti-Flow

coal nozzle, by virtue of its operating in a reducing atmosphere, converts the fuel bound nitrogen in the coal volatiles into N2 thus substantially reducing NOx formation and emissions.

3.0 SYSTEM OPTIMIZATION PROCEDURE

3.1 Purpose / Intent

It is very important to note that the purpose of the optimization procedure is to obtain the best overall furnace fires at approximately 20% excess air and to balance or normalize the economizer exit flue gas O2 and CO distributions, and to minimize the NOx levels leaving the stack. It is not the intent or the purpose of this optimization program to equalize the airflow through each burner. Due to differences in conduit-to-conduit coal distribution and the nature of airflow in the furnace, equalizing the burner-air flows may not produce optimum flame shape and balanced flue gas constituent distribution. For this reason the above testing should only be performed by qualified ABT personnel who are fully familiar with the Opti-Flow burner system components and their effect on furnace fires and flue gas constituents.

It is intended that station personnel will work closely with the ABT Service Engineers during the start-up and burner optimization process. In this way, they will become acquainted with the equipment and the procedures used to adjust and modify the combustion process.

3.2 Instrumentation

In order to perform Opti-Flow Low NOx Burner optimization, the following instrumentation is required:

- SAD Sleeve damper position indication.
- An economizer outlet flue gas sample grid, which measures exit gas O2, CO and NOx on a per point basis.
- Individual OFA port flow measurement. (If an OFA System is provided)

3.3 Preparation for Optimization

a. The steam generator's steam flow should be set as close as possible to 100% MCR prior to beginning optimization.

b. With the furnace excess air at approximately 20%, the O2 is to be balanced across the economizer exit.

a. Ensure that coal and primary airflow to the pulverizer (and primary air temperature leaving the pulverizer) are in accordance with the steam generator operating

instructions. All pulverizers should be in service at equal throughput. Coal feed and primary air measuring devices should be calibrated prior to testing.

b. Normal sootblowing schedules should be adhered to.

c. Check that economizer outlet flue gas sample grid extends across the width of the flue and measures exit gas NOx, O2 and CO on a per point basis. Ensure that any test equipment has been calibrated prior to and after each test phase.

d. Be prepared to record relevant unit data during optimization testing.

e. Actual optimization (at 100% MCR) will begin with components at predetermined positions similar to the following example:

Burner Secondary Air Sleeve Dampers (SAD)	80% Open
Burner Outer Air Registers Spin Vanes	40% Open (initially)
Burner Inner Air Sleeve Damper (Diverter Cone)	20% Open (initially)

Each burner is comprised of the following adjustable components: One Sleeve Damper (SAD), one Outer Air Register Spin Vane, and one Inner Air Sleeve Damper. These adjustable components are used to control the shape and ignition point of the flame, which in turn controls NOx, O2 distribution and CO emissions.

The setting of all of these adjustable components is established during initial start-up (optimization) when the proper test instrumentation is installed. The final settings are tabulated and provided to the customer for future reference. During normal operation following optimization, no adjustments should be necessary (adjustable components are either set or automated) as long as fans, air heaters, pulverizers, etc. are operating properly. Station instrumentation should be monitored to verify that readings match the tabulation supplied following optimization. Visual observation of the flames should also be made to assure proper combustion is occurring. Should any emission readings deviate from normal, then the settings should be checked and readjusted as necessary to return the adjustments to their original settings. Major adjustments are not necessary unless a significant change in fuel supply characteristics occurs. In that case, re-optimization will be required and new settings will have to be determined.

3.5 Initial Start-up Procedure

Bring ignitors into service and with a setting between 20 and 30% open on the burner's secondary air outer sleeve dampers (SAD); light off the burners following the normal start-up procedure. Take ignitors out of service after main flames are stable. Burner dampers should now be set at 80% open or any position that will yield a stable flame condition. Check that there is no flame impingement on any steam generator components

and that the flame generally fits the furnace. Ensure that the flame ignition point is in the burner throat. Flame should be bright with little or no smoke. Refer to the steam generator's operating instructions and bring the steam generator to 100% load, while periodically performing the aforementioned flame inspections. Readjust burner parameters such as secondary air sleeve damper (SAD), inner sleeve damper, and outer register vanes, if necessary to attain stable flames.

Adjust the burner SAD dampers to balance the side-to-side O2 profile across the economizer exit flue and minimize CO concentrations. For example, if the O2 value is low on the sides of the unit, SAD's on the outboard columns of burners will be incrementally opened to force more air to the sides of the unit to raise the O2. SAD's in a specified burner column are generally positioned to the same setting. The primary method of optimizing SAD position is the O2 and CO distribution. The secondary method is to monitor the register's secondary airflow. Several adjustments of the outer sleeve dampers are usually required to optimize the O2 and CO distribution. As the O2 is optimized, the CO should fall within acceptable limits. CO inversely follows O2 adjustments; e.g. as O2 decreases, CO increases. While maintaining a 2.5 to 3.5" H_2O ΔP from the windbox to the furnace, (with 20% excess air) O2 should be approximately 3.28% by volume (in wet flue gas) or 3.57% (in dry flue gas) by volume. If the ΔP cannot be attained, incrementally close all burners SAD's to raise the pressure differential (while maintaining the O2 and CO balance). Record values attained. Once the SAD's have been optimized, retain these new open (light-off and firing) positions. Minor variations from these positions may be required later based on the results of the remaining burner optimization.

After the optimum SAD positions have been determined and set, the outer air registers will be adjusted to obtain the lowest possible NOx values with acceptable O2, CO and unburned carbon. The unburned carbon is a site-specific value, dependant on the actual coal being fired, coal fineness, as well as the unit's furnace configuration. The inner air sleeve damper will remain at the 20% open position and the adjustable tip will be in 0" neutral position. The first set of data will be gathered with the outer registers set at 40% open. Subsequent adjustments will be to test with all burner outer registers at 30%, 20% and 60% open as a minimum. Outer register positions are intended to be uniform on all burners, however in some instances it may be necessary for some burners to be set slightly different in order to provide good flame shape, desired ignition points or aid in optimizing O2/CO distribution.

Now that the outer registers have been optimized, proceed with inner register adjustments. The same philosophy used to reduce NOx in the previous paragraphs will be applied here; however, the range of open register positions is different. The first test will be run with the inner registers set at 20% open. Subsequent adjustments will be to test all burner inner registers at 30% 15% and 0% open as a minimum. The test grid results will dictate the best position.

With the SAD and outer/inner registers set at their optimized positions, record emissions

at the stack.

NOTE

DURING REGISTER POSITIONING IT IS IMPORTANT TO STROKE ALL REGISTERS TO THEIR NEXT POSITION CONSISTENTLY. WHEN MOVING A REGISTER TO A FURTHER OPEN POSITION, OPEN THE REGISTER 15-20% FURTHER THAN THE DESIRED SETTING, THEN IN A CLOSED DIRECTION UNTIL THE DESIRED POSITION IS ATTAINED. WHEN MOVING A REGISTER TO A FURTHER CLOSED POSITION, JUST CLOSE DOWN THE REGISTER UNTIL THE DESIRED POSITION IS ATTAINED.

3.6 Additional Testing

Following completion of full-load optimization testing on all burners, additional testing should be performed under the following conditions:

- Full load testing should be performed with one row of burners out-of-service. Check the flame shapes and flue gas O2 and CO side-to-side distribution. Should this test produce an unacceptable flame shape or flue gas O2 and CO side-to-side distribution, some of the "optimum" burner settings should be fine-tuned. For units with two firing walls, a double check should be performed by again performing the foregoing test with a row of burners out-of-service on the opposite firing wall.

- Test at control load (at a reduced load where main steam and/or reheat steam temperatures can be maintained at full-load values).

- Test at minimum load (at the lowest reduced load such that any additional load reduction would cause unstable firing).

This additional testing is performed to check that the foregoing established settings produce acceptable results over the total load range. However, minimal adjustments may be required to obtain desired flame shapes, emissions, etc. at these loads.

Following completion of this off-full-load testing series, the unit shall be returned to full load/all burners operation for a final check and fine-tuning. The burner air register, sleeve damper, inner air damper and sliding tip positions found following the fine/tuning are the final optimum positions for the system. All the positions shall be noted for future reference.

At the conclusion of testing, combustion efficiency should be checked. An acceptable unburned carbon value is an inherent result of the forgoing optimization procedure, which provides the proper mix of fuel and air along with optimized O2, CO and NOx and therein-acceptable combustion efficiency.

4.0 OPERATION

4.1 General

The following burner operating procedures should be used in conjunction with the steam generator and auxiliary equipment operating procedures.

4.2 Start-up

a. The secondary air flow should be set at not less than the established flow for the boiler purge at all times.

b. The outer Secondary Air Sleeve damper (SAD) preliminary positions are set during initial start-up and optimization for the burners, and are in auto control (if electrically equipped) thereafter. In addition, the outer air register (swirl) and inner air register damper, are also set during optimization and should not require additional adjustment.

c. If the burner had been operating prior to this light off, a fifteen-minute burner tip cool down period shall be completed prior to establishing coal flow to the burner. This cool down is required to avoid coking from starting on the hot tip surface. This is normally accomplished by purge airflow or by warm-up air, during the mill warm-up time, with the coal feeder off.

d. Confirm that the ignitors are operable and ready for operation. If an Ignitor or burner is inoperable, it is recommended that the entire burner group not be started.

e. Select the burners (and pulverizer) to be initially placed into service. Preferably, this should be the lowest row of burners. However, as operating experience and / or operating conditions dictate, other rows can be started first.

f. Light the ignitors for the selected burners and confirm ignition. Refer to the Ignitor manufacture's instructions in your plants operations books. All the burner ignitors associated with one pulverizer should be in service prior to coal being established.

4.3 Procedures for Firing

a. Observe the fires periodically to be certain that there is no heavy flame impingement on any of the furnace heating surfaces. This may occur due

to improper burner adjustments or pulverizer operation.

b. The fuel-air mixture temperature leaving the pulverizer should be maintained at the temperature required by the pulverizer for stable burner operation. This exit temperature is determined by observing flame stability characteristics during actual operation. Initially set the exit temperature at 160^0F. Depending on the fuel being burned, pulverizer exit temperature may vary between 125^0F and 170^0F with acceptable stable flame conditions at the burners.

c. It is desirable to keep as many burners and pulverizers in service as the boiler load will permit. However, when the load is to be decreased below the stable minimum output for burners, burners by groups associated with pulverizers should be taken out of service. At low capacity operation, it is important that burner operation be watched closely to insure stable combustion conditions are maintained during this period.

d. Place the igniters into service for those burners that are to be taken out of service. If there is evidence of instability due to some abnormal condition of operation or fuel quality, and it remains possible that the root cause is furnace-wide, it may be desirable to use the igniters for all burners installed in the furnace. SAFETY—FIRST

CAUTION

IF OPERATION WITH PULVERIZED FUEL APPEARS UNSTABLE, THE USE OF IGNITERS FOR FLAME STABILITY MAY BE REQUIRED AT THE DISCRETION OF THE OPERATOR. ALWAYS MAINTAIN A SAFE, STABLE FLAME. PAY CLOSE ATTENTION TO THE MAIN FLAME SCANNER SIGNAL STRENGTH.

4.4 Fuel Leaks

Fuel leaks to the burner deck or windbox shall be corrected immediately following discovery. Check mating flanges and connecting points in all fuel lines regularly. To avoid fire hazards, the total burner area should be maintained in an extremely clean condition. Any fuel that may have leaked should be cleaned-up immediately.

CAUTION

AFTER A PULVERIZER IS SHUT DOWN, THE PULVERIZER COAL CONDUITS AND BURNERS MUST BE PURGED OF ALL COMBUSTIBLES

5.0 MAINTENANCE AND LUBRICATION REQUIREMENTS

5.1 General

This section contains special maintenance and lubrication requirements for Opti-Flow burner components. The requirements are defined under each component's title below. In general, a maintenance and repair log should be kept for all maintenance and repair operations performed. Close review of this log will help isolate problem areas and reduce trouble-shooting time. Review applicable vendor literature for maintenance of components such as ignitors/scanners.

5.2 Burner Inner damper and Outer Register Manual Drives

The assemblies require minimal maintenance. The shaft seals are comprised of a 3/8" x 3/8" Square Graphite fiber rope packing.

5.3 Burner Sleeve Damper (SAD)

The only moving parts of damper assembly that may need to be lubricated during each maintenance outage are the shafts and support rollers. Molykote 321-R (Dow Corning Corp., Midland, Mich. 48640) or equivalent should be used if binding occurs. It is preferable not to lubricate these components.

6.0 SPECIAL TOOLS

6.1 General

There are no special tools required to assemble, disassemble, or maintain the Opti-Flow burners; a set of common mechanic's tools will suffice.

7.0 ASSEMBLY AND DISASSEMBLY

7.1 General

Assembly and disassembly of the Opti-Flow burner shall be accomplished in accordance with the drawings. Erection and general notes on the drawings, as well as the dimensional layout, define the method of assembly (and therefore disassembly).

7.2 Jordan Sleeve Damper Drives

Please refer to the Jordan Controls Manual located in the appendix for information concerning maintenance and operation of these drives.

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 11/18/2003 2:05:34 PM
Subject: ABT Elbow Burner Operating Instruction

Phil,

Attached is generic set of our operating instructions. These will be massaged to be specific for the IPSC burners. I hope this is satisfactory for your needs for now.

Regards,

Sal

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/2/2004 2:57:09 PM
Subject: Contract 04-45606, HFD Shipment

Howard,

See attached paperwork for shipment that was picked up at JMS today. These were shipped by ABF's express service "TimeKeeper Service". I expect at least 4 more HFD's to be ready to ship tomorrow.

Sal

CC: "Tarkel Larson" <tarkel@advancedburner.com>, "Phil Hailes" <Phil-H@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/31/2004 9:45:24 AM
Subject: Contract 04-45606, Replacement Thermocouples

Howard,

Attached for your information is the "pick ticket" for shipment of the 96 replacement thermocouples that shipped yesterday by UPS ground.

Regards,

Sal

CC: "Jerry Finlinson" <Jerry-F@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 12/22/2003 3:15:40 PM
Subject: Contract 04-45606, Scanner System Change Request

Jerry,

Below is price quote to provide the changes you requested on the ABB Scanner system scope of supply:

1) a change to 24-inch deep system electronics enclosures (2) can be accommodated at no additional charge.

2) a change to supply of the 3-channel junction boxes (jbs) so that they include States sliding link terminals instead of the standard GE terminals. To accommodate this request, a larger enclosure will also be required. The added cost to our contract to provide (16) custom jbs as requested comes to $5760 or $360 per jb.

3) a change to supply of the 3-channel junction boxes (jbs) so that they include LED indicators and States sliding link terminals instead of the standard GE terminals. To accommodate this request, a larger enclosure will also be required. The added cost to provide (16) custom jbs as requested comes to $6,480 or $405.00 per jb.

4) a change to supply of the system electronics enclosures (that house the scanner chassis) so that they include a total 250 States sliding link terminals per enclosure. We can accommodate this request in two ways, wired or not wired. The added cost to provide (2) custom system electronics enclosures as requested is as follows:

Wired = $14,480 ($7,240 per enclosure)

Not Wired = $8,280 ($4,140 per enclosure)

These are lump sum, fixed price quotes that are valid for 30 days. Schedule of delivery is consistent with base order if we receive formal authorization for this requested change by 12/31/03. This material will be delivered in accordance with the terms and conditions of the base order. These additional fees will be invoiced upon shipment and payable within 30 days.

Please let us know if this is agreeable to IPSC. If so, please forward your formal authorization to me at your earliest convenience, no later than 12/31/03.

Regards,

Sal Ferrara

CC: "Phil Hailes" <Phil-H@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/2/2004 2:38:02 PM
Subject: Contract 04-45606, Windbox Perforated Plates

Howard,

Following perforated plate for installation in the burner windboxes, 4' x 10' sheets-11 gauge, have shipped from McNichols Co.:

27 sheets, 48% open area, from Chicago via CCX (800-755-2728), tracking no. 949854813

24 sheets, 60% open area, from LA via FED-X (800-463-3339), tracking no. 715131165

The rest of the perforated plate, 50 sheets, 40% open area, will be shipping tomorrow. I will provide you with the truck information then.

I am in the process of ordering the remaining material for installation in the burner windboxes (qty 12, 4' x 10' sheets-11 gauge plate and angles for stiffening). All windbox material is carbon steel. Drawings showing locations of plate are currently being finalized and I will forward them to you as soon as they are released to me.

Regards,

Sal

CC: "James Nelson" <JIM-N@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>, "Tarkel Larson" <tarkel@advancedburner.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 12/18/2003 8:17:08 AM
Subject: Contract 04-45606

Phil,

ABB advises that they have been requested by Jerry Finlinson/IPSC to quote a change to their standard supply 3-channel junction boxes (jbs) so that they include States sliding link terminals instead of the standard GE terminals. To accommodate this request, a larger enclosure will also be required. The added cost to our contract to provide (16) custom jbs as requested comes to $5760 or $360 per jb.

This is a lump sum, fixed price quote that is valid for 30 days. Schedule of delivery is consistent with base order if we receive formal authorization for this requested change by 12/30/03. This material will be delivered in accordance with the terms and conditions of the base order. This additional fee will be invoiced upon shipment and payable within 30 days.

Please let us know if this is agreeable to IPSC. If so, please forward your formal authorization to me at your earliest convenience, no later than 12/30/03. Thanks for your cooperation in this matter.

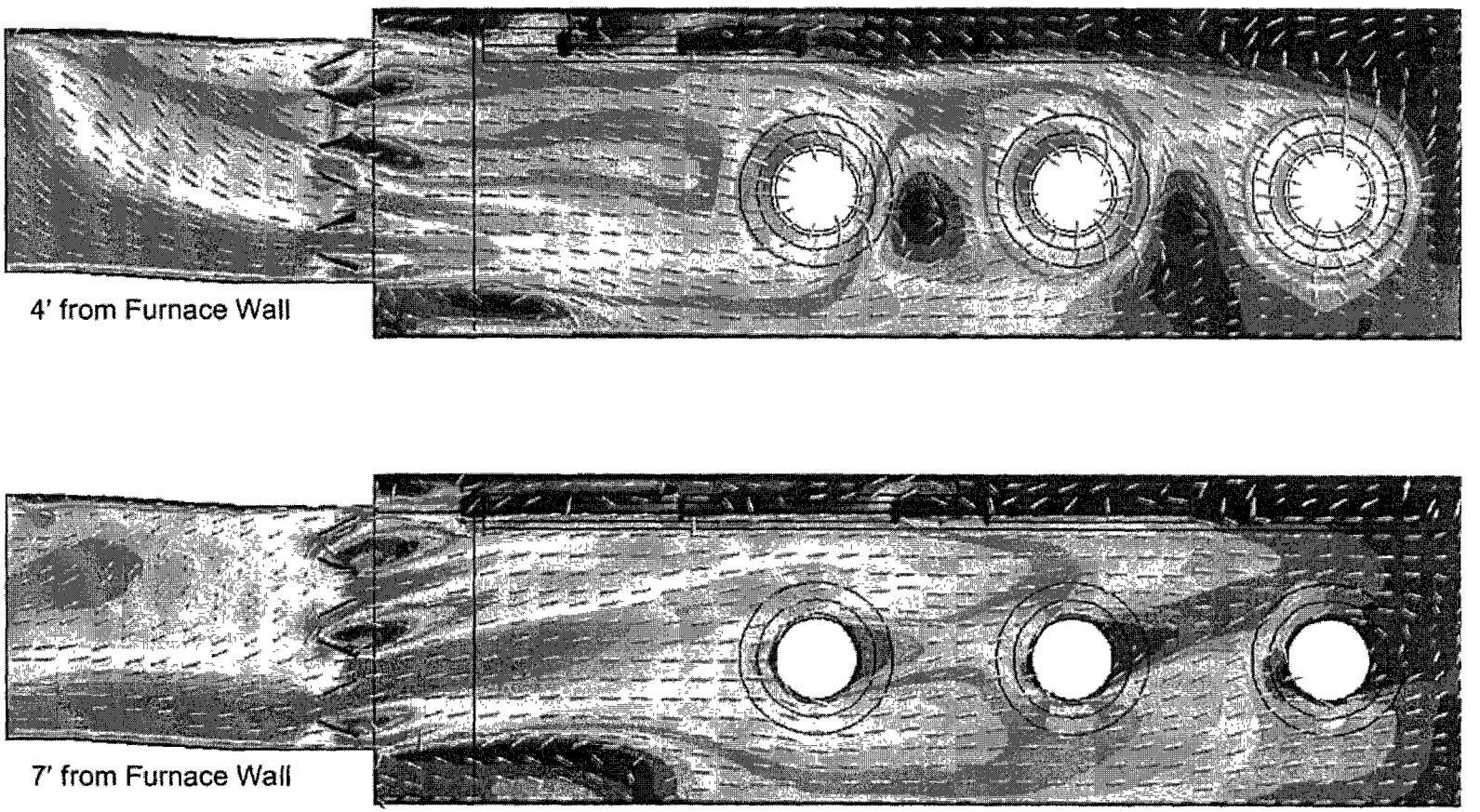
Regards,

Sal

CC: "Jerry Finlinson" <Jerry-F@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

Total Velocity Magnitude - Baseline (2)

North Side Level 1 - View from North



Airflow Sciences Corporation

Figure 11

IP7_030238

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/19/2004 12:43:25 PM
Subject: Contract 04-45606, Additional Perf Plate

Howard,

Confirming our telephone discussion earlier today, the perforated plate is coming on 2 shipments and will be delivered tomorrow (Saturday) via Conway:

Tracking No. 552452040, 23 sheets, 4' x 10', 48% perforated plate

Tracking No. 692951394, 8 sheets, 4' x 10', 40% perforated plate and 10 sheets, 4' x 10' 60% perforated plate

Conway phone no. 1-800-782-4874.

Sal

CC: "James Nelson" <JIM-N@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>

Normal / Tangential Velocity at OFA Register Dampers - Baseline (2)

North Side Level 1 - View from North

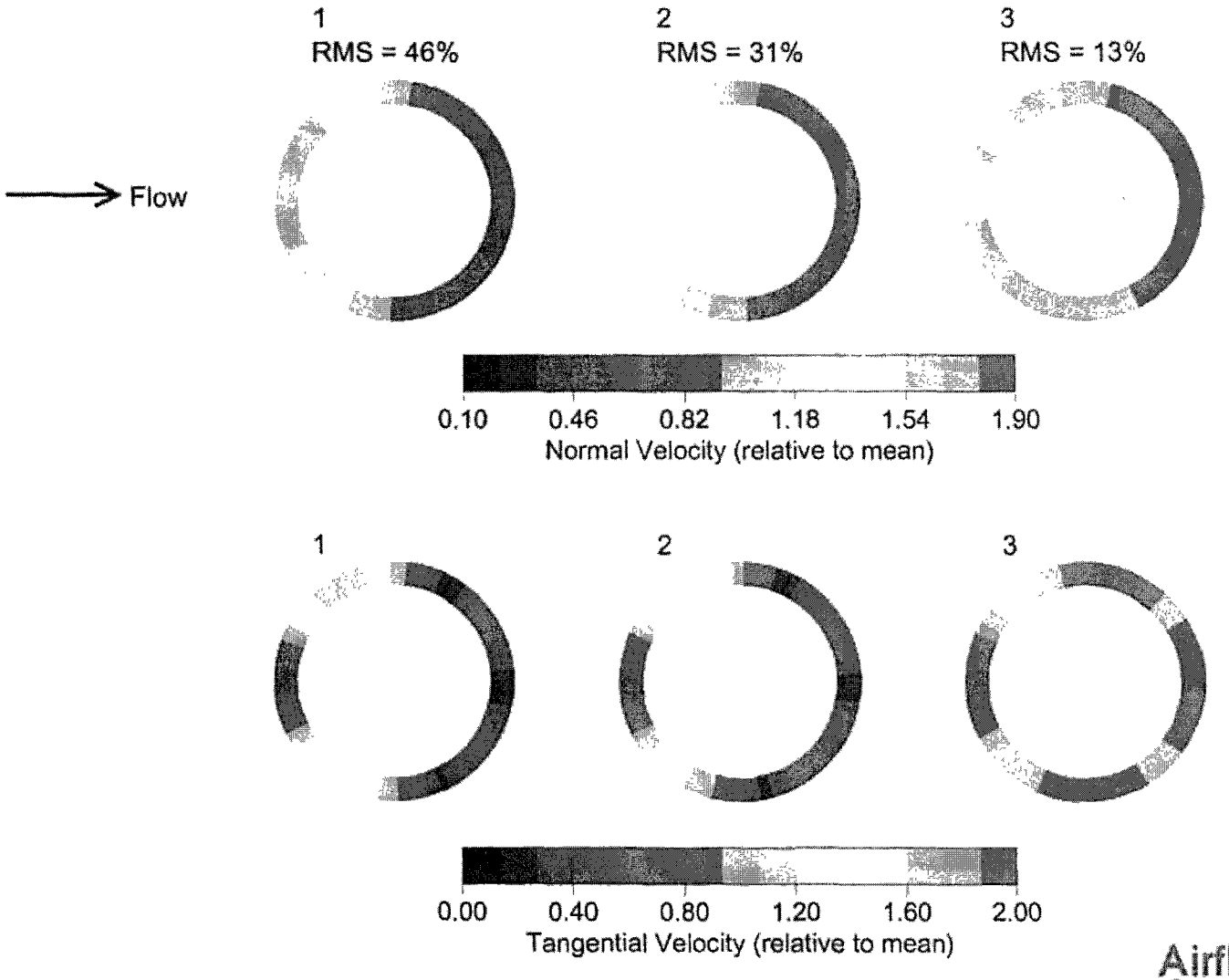


Figure 19

Airflow Sciences Corporation

IP7_030240

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 12/17/2003 12:58:13 PM
Subject: Contract 04-45606, Burner Model

Howard,

Attached is a drawing showing 3-d model of the burner we've designed for this contract. To open this you need the E-Drawing 2004 viewer which is a free download from the "solidworks.com" website.

I received a message that you called and asked if we can provide shrink wrap on the burner. Which components would you like to see shrink wrapped (knowing this I can obtain a fixed price from our fabricator to apply the shrink wrap accordingly).

Sal

CC: "Phil Hailes" <Phil-H@ipsc.com>

ADVANCED BURNER TECHNOLOGIES
P.O Box 410, 271 Route 202/206
Pluckemin, NJ 07978
Phone: 908-470-0470; FAX: 908-470-0479
www.advancedburner.com

November 19, 2003

Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Attention: James Nelson

Reference: IPSC Contract 04-45606
Unit 2 Low NOx Burners

Dear Mr. Nelson:

Confirming our previous discussion, the ABT burners on the subject Contract are designed for a maximum throughput of 220 MBtu/hr.

Please advise should you have any other questions.

Sincerely yours,

Sal N. Ferrara
Director of Proposals & Projects

cc: TarkelLarson
JoelVatsky

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 1/8/2004 4:26:31 PM
Subject: Contract 04-45606, Burner Module Inspection Checklist

Phil,

See attached inspection checklist that the PCW shop is using for assembly of the burners on this contract.

Sal

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 1/20/2004 2:29:10 PM
Subject: FW: IPSC Contract 04-45606

Here's the 2nd email with rest of the drawings.

Sal

-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Tuesday, January 20, 2004 4:17 PM
To: Phil Hailes
Cc: James Nelson; Howard Hamilton (howard-h@ipsc.com)
Subject: IPSC Contract 04-45606

Phil,

See attached document transmittal and associated drawings created in either Solidworks or AutoCad. Howard Hamilton advised that he downloaded the free solidworks "E-Drawing viewer" so that you can open the .edrw drawings and print them. I am also mailing you 3 sets.

I'm sending this in 2 emails.

Regards,

Sal

CC: "Howard Hamilton" <howard-h@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 12/5/2003 6:48:18 AM
Subject: FW: IPSC Contract 04-45606, CFD Model

Phil,

I haven't heard from you yet on questions in this letter. When do you think you'll have some answers for me?

Sal

-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Wednesday, November 26, 2003 7:21 AM
To: Phil Hailes
Cc: James Nelson; Joe Malone; Chuck Onaitis (chuck@advancedburner.com)
Subject: IPSC Contract 04-45606, CFD Model

Phil,

See attached letter containing questions we have regarding input to the model. Please advise answers so we can complete the model.

Regards,

Sal

P.S.:

Regarding your question on burner rotations shown on our arrangement drawings 03008-100-A01-FW & -RW, we are changing the rotations from the OEM's. It is our experience that the rotation scheme we have shown works well and we believe it provides the best mixing.

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 1/23/2004 8:24:23 AM
Subject: FW: Photos - PCW

Phil,
The first shipment of 4 burners left NJ yesterday @ 3:30 PM. See attached pictures of loading & handling.
Sal

-----Original Message-----
From: Alex [mailto:alex@pcwfab.com]
Sent: Friday, January 23, 2004 8:30 AM
To: Ron Jones; Sal Ferrara; Chuck Onaitis
Subject: Photos - PCW

Gentlemen,

Please find attached photos for your edification.

Regards,

Alex Mankiewicz

CC: "James Nelson" <JIM-N@ipsc.com>, "Howard Hamilton" <howard-h@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 2/9/2004 11:20:11 AM
Subject: FW: Questions and requests Concerning the removal and installation of the existing B&W Oil Igniter

Howard,
See our responses added below.
Sal
> -----Original Message-----
> From: Howard Hamilton [mailto:howard-h@ipsc.com]
> Sent: Monday, January 26, 2004 4:24 PM
> To: sal@advancedburner.com
> Cc: James Nelson; Phil Hailes; ssteede@teiservices.com
> Subject: Questions and requests Concerning the removal and
> installationof the existing B&W Oil Igniter
>
> Reference Drawing 03008-100-A02-D0 entitled, "Field Assembly":
>
> 1. Removal and installation note on drawing 03008-100-A02-D0 states,
> "Install Oil Lighter per this drawing and B&W Drawing 29435E."
>
> I have been able to locate B&W Drawing 294359E that is a sectional
> assembly drawing for the existing Mark V B&W Burners.
>
> I assume that ABT meant to reference drawing 294359 in note 19, is
this
> correct?
>

> Response:
> We meant to reference B&W Drawing 294359E.

> 2. Section A-A on Drawing 03008-100-A02-D0 calls out a 3/16" fillet
> seal weld for attaching the old B&W igniter to the new ABT Burner
Front
> Plate.
>
> What is the front plate of the new ABT Burner made out of?
>

> Response: A36 carbon Steel
>
> What is the P number and ASME material designation for the ABT front
> plate?
>
> Response:ABT does not use pressure part specifacations for
non-pressure
parts. All of our welds are carbon steel to carbon steel unless noted
othewise.

>
> The lighter sleeve that is shown welded to the ABT front plate is made
> of carbon steel.
>
> What type of welding rod is required and is preheat or post heat
needed
> for this weld?
>
> Response:Welding proceedures are to be provided by the welding
contractor,
not the equipment supplier.
>

> 2. B&W drawing 294359E calls for the CFA lighter to be horizontal
where
> ABT Drawing 03008-100-A02-D0 calls for the CFA lighter to be at an
> angle.
>
> What is the horizontal angle of the B&W CFA lighter in the new ABT
> Burner?
>
> Response: This is not a replacement in kind burner. The igniter is to
be
installed in the indiacted position on the burner. The burner companrnts
are
designed to set the proper angle of the igniter.

>
> 3. B&W drawing 294359E calls for the face of the CFA lighter shield to
> be located back from the centerline of the boiler wall 5 1/4". ABT
> Drawing 03008-100-A02-D0 does not call out this end limiting
dimension.
>
> Where does ABT want to locate the face of the CFA lighter shield with
> respect to the centerline of the boiler wall?
>
> Response: Use the B&W dimension.

>
> 4. B&W drawing 294359E calls for a distance from the centerline of the
> burner to the centerline of the lighter to be 16-15/16" at both the
> front and rear ends of the lighter, which also tells one that the
> lighter is horizontal. ABT Drawing 03008-100-A02-D0 does not call out
a
> distance from centerline dimension for either the front or rear of the

> lighter.
>
> What dimension from centerline does ABT want to locate the CFA lighter
> both front and rear end of same?
>
> Response: See above.

>
> 5. Does ABT require any field alteration to the burners, such as
> trimming vanes?
>
> Response: No.
>
>
>
>

CC: "James Nelson" <JIM-N@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 12/31/2003 9:04:57 AM
Subject: Directions to Passaic County Welders

Phil,

Below are direction from Newark Airport to Passaic County Welders at 100 Parish Drive , Wayne NJ 07470, Phone: 973-696-1200:

From Newark Airport follows signs at airport exit to Interstate 78 West. Stay on 78 west for approx. 5 miles and exit onto the Garden State Parkway North. Take GS Parkway and exit at 153B onto route 3 West. Stay on route 3 and exit onto route 46 West. Take route 46 about 4 miles and exit onto route 23 North. Exit Route 23 and take the first exit "Lincoln Park". After exiting Route 3 go to stop sign and turn left. Go about 2 blocks and turn right onto Parish Drive. Take Parish Drive and go over railroad bridge, PCW will be on right side just past the bridge.

I can meet you at PCW @ 9:00 am or can meet you at your hotel earlier and drive together to the shop. What hotel are you staying at and phone number?

Sal

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 11/19/2003 12:59:59 PM
Subject: FW: Contract 04-45606 - Burner Throughput

Phil,

Please discard the letter attached to my previous email and use the one attached. The address in the original letter was incorrect.

Sal

-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Wednesday, November 19, 2003 2:35 PM
To: Phil Hailes
Cc: James Nelson
Subject: Contract 04-45606 - Burner Throughput

Phil,

See attached letter you requested. Let me know if you need anything else.

Sal

CC: "James Nelson" <JIM-N@ipsc.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "James Nelson" <JIM-N@ipsc.com>
Date: 8/25/2004 3:04:36 PM
Subject: IPSC Contract 04-45606 - Meeting

James,
Following up on our conversation last week, I will be traveling with Joel Vatsky and Tarkel Larson to meet with you on site in Delta, UT starting at 9:00 AM Wednesday, 9/1/04. We are traveling out there on Tuesday and plan to travel back home on Thursday, so we have should have sufficient time Wednesday to discuss any questions you may have on the test results and contract closure issues.
This week I will also be issuing to Phil Hailes the as-built drawings of windbox turning vanes and baffles.
Sal

CC: "Phil Hailes" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 2/23/2004 12:38:33 PM
Subject: IPSC Contract 04-45606 (SA Duct Turning Vane Details)

Phil,

See attached document transmittal and associated turning vane details drawings for your use. Howard Hamilton should be able to print these out with e-drawing viewer. I also put 3 copies in a DHL package.

There is more to come as stated in the transmittal and I will get those to you as soon as I receive them.

Sal

CC: "James Nelson" <JIM-N@ipsc.com>, "Howard Hamilton" <howard-h@ipsc.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 8/25/2004 3:36:00 PM
Subject: IPSC Contract 04-45606 (WB Turning Vane AsBuilt Drawings)

Phil,
Attached is drawing transmittal document and drawings that are being mailed out to you tomorrow. These drawings were revised to depict the actual installation.
Sal

CC: "Howard Hamilton" <howard-h@ipsc.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "James Nelson" <JIM-N@ipsc.com>
Date: 8/20/2004 12:43:14 PM
Subject: IPSC Contract 04-45606 Status

James,
Attached is ABT letter concerning the status of the contract, retention, and also our report summarizing testing performed in May.
Joel Vatsky and I would like to plan a trip the end of this month to meet with you at the plant as you suggested. We would travel on Tuesday August 31st , meet with you on Wednesday Sept. 1st, , then travel home on Thursday Sept. 2nd.
Please confirm whether or not this works with your schedule.
Sal

CC: "Phil Hailes" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/2/2004 8:35:22 AM
Subject: IPSC Contract 04-45606

Howard,

The first shipment of 12 HFD's were picked up yesterday at the JMS shop in Latrobe, PA. Attached are the shipping documents. We contacted ABF Freight today and they promised delivery to IPP this Friday by 5:00 PM.

JMS had problems obtaining ceramic materials to complete the work by end of last week. They have all ceramic on hand now and are expediting completion. I'll let you know later today when the next shipment is expected to be leaving the JMS shop. We'll try to make a shipment each day in order to maintain a steady flow of HFD's to keep your installers going.

Sal

CC: "Tarkel Larson" <tarkel@advancedburner.com>, "Phil Hailes" <Phil-H@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

Inspection Check List – Complete Burner Module

Customer/Plant:	Contract Number:	Burner No:
Intermountain Power Service	IPSC: 04-45606, ABT:A03008	

Operational Testing Note:- use operator if shop installed - insure correct indicator/pin position	**Accept** ✓	**Init**	**Comment**
Sleeve damper full stroke operation			
Outer Spin Vanes full stroke operation			
Inner air zone damper full stroke operation			

Dimensional Checks	**Drawing Value**	**Actual Value**	**Init**
Distance from I.S. face of WB closure plate to burner throat			
OD of burner throat- check at 4 locations (record max.)			
Verify clearance/play for moving part (1/8" min. over full range) @ assembly of sub-assemblies			
Distance from O/S fuel inject mounting plate to O/S fuel injector flange			
Distance from face of burner throat to face of flow divider			
Distance from face of flow divider to face of OBB cast tip			
Concentricity, OBB tip to flow divider (record max/min)			
Concentricity, flow divider to burner throat (rec. max/min)	Min: Max:		

Miscellaneous Verifications	✓
Verify ignitor clearance for (test pipe of same OD as igniter support pipe)	
Verify line of sight with registers open and closed for a main flame scanner	
b igniter scanner	
c sight glass	
Verify that packing was installed in packing glands	
Verify that packing glands are loose (bolts finger tight & taped)	
Verify burner number- rotation and fuel injector number agree with GA	
Mark WB closure plate with arrow, CW/CCW, and assembly number	
Verify spring pins are installed on all manual control rods	
Verify all temporary shipping supports are welded and marked with yellow paint	
Strip all masking	
Verify load includes correct number of loose parts, identified on GA, for each burner	
Secure packing list to one burner of each load	

ADVANCED BURNER TECHNOLOGIES
271 Route 202/206
P.O. Box 410
Pluckemin, New Jersey 07978
Phone: 908-470-0470; FAX: 908-470-0479

DRAWING TRANSMITTAL

CONTRACT 04-45606 Burner Arrangement & Field Assembly January 20, 2004

TO: Phil Hailes
FROM: Sal Ferrara

CODE	DRAWING NUMBER	REV	DRAWING TITLE
2 5	03008-100-A01-FW	1	IGS UNIT 2, GENERAL ARGM'T, FRONT WALL
2 5	03008-100-A01-RW	1	IGS UNIT 2, GENERAL ARGM'T, REAR WALL
2 5	03008-100-A00-D0	3	IGS UNIT 2, GENERAL ARGM'T
2 5	03008-100-A02-D0	-	IGS UNIT 2, FIELD ASSEMBLY
2 5	03008-500-A02-D0	-	HORIZONTAL FUEL DISTRIBUTOR ASSEMBLY
2 5	03008-500-A03-D0	-	EXISTING ELL MODS INSTALLATION OF VFD

NOTE: Enclosed for your information and use during field installation are the listed burner drawings.

Please advise should you have any questions on these drawings.

Note that the General Arrangement drawings were revised to incorporate IPSC comments received based on previous issues.

CODE

1 FOR REVIEW
2 FOR ISSUE
3 FOR INFORMATION
4 FOR COMMENT
5 FOR MANUFACTURE
6 OTHER

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271 Route 202/206
P.O. Box 410
Pluckemin, New Jersey 07978
Phone: 908-470-0470; FAX: 908-470-0479

DRAWING TRANSMITTAL

CONTRACT 04-45606 **Burner Field Assembly** **February 18, 2004**

TO: Phil Hailes
FROM: Sal Ferrara

CODE	DRAWING NUMBER	REV	DRAWING TITLE
2 5	03008-100-A02-D0	2	IGS UNIT 2, FIELD ASSEMBLY
2 5	03008-100-A03-D08	1	AIR REG. CROSS-OVER SUPPORT END GUIDE
2 5	03008-100-A03-D17	-	MOUNTING SPACER ANGLE
2 5	03008-500-A02-D0	1	HORIZONTAL FUEL DISTRIBUTOR ASSEMBLY

NOTE: Enclosed for your information and use during field installation are 3 sets of the listed burner drawings. Revisions were made to reflect the assemblies as they are shipping. The Mounting Angle (Item 16) is shipped loose and is required for replacement of the rolled ring (Item 10) ring that was shipped tacked to the burner front plate. The drawing installation instructions were revised to reflect this change.

Please advise should you have any questions on these drawings.

CODE

1 FOR REVIEW
2 FOR ISSUE
3 FOR INFORMATION
4 FOR COMMENT
5 FOR MANUFACTURE
6 OTHER

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P.O. Box 410
Pluckemin, New Jersey 07978
Phone. 908-470-0470, FAX: 908-470-0479

DRAWING TRANSMITTAL

CONTRACT 04-45606 **SA DUCT TURNING VANES** **FEBRUARY 23, 2004**

TO: Phil Hailes
FROM: Sal Ferrara

CODE	DRAWING NUMBER	REV	DRAWING TITLE
2, 5	03008-800-A01-MK1	-	TURNING VANE MK1
2, 5	03008-800-A01-MK2	-	TURNING VANE MK2
2	03008-800-A01-MK5	-	TURNING VANE MK5
2	03008-800-A01-MK6	-	TURNING VANE MK6
2, 5	03008-800-A01-D01	-	TURNING VANE MK1 PL-1
2, 5	03008-800-A01-D02	-	TURNING VANE MK 2 PL-5
2, 5	03008-800-A01-D05	-	TURNING VANE MK 5 PL-11
2, 5	03008-800-A01-D06	-	TURNING VANE MK6
2, 5	03008-800-A01-D08	-	MOUNTING PLATE PL-2
2, 5	03008-800-A01-D09	-	MOUNTING PLATE PL-3
2, 5	03008-800-A01-D10	-	MOUNTING PLATE PL-4
2, 5	03008-800-A01-D14	-	TURNING VANE MK2 PL-6
2, 5	03008-800-A01-D15	-	TURNING VANE MK2 PL-7
2, 5	03008-800-A01-D16	-	MOUNTING PLATE PL-8
2, 5	03008-800-A01-D17	-	MOUNTING PLATE PL-9
2, 5	03008-800-A01-D18	-	MOUNTING PLATE PL-10
2, 5	03008-800-A01-D21	-	MOUNTING PLATE PL-12
2, 5	03008-800-A01-D22	-	MOUNTING PLATE PL-13
2, 5	03008-800-A01-D23	-	MOUNTING PLATE PL-14
2, 5	03008-800-A01-D24	-	MOUNTING PLATE PL-15
2, 5	03008-800-A01-D25	-	MOUNTING PLATE PL-16
2, 5	03008-800-A01-D26	-	MOUNTING PLATE PL-17

NOTE: Enclosed for your use in purchase of material and field installation are 3 sets of the listed Secondary Air Duct Turning vane drawings. These provide details for the vanes associated with Air Flow Sciences windbox model schematics L-04-ABI-06, Figures 7 & 8, Horizontal Vanes. Note that Vanes MK5 and MK6 will be revised for notching to clear steel however the associated drawings enclosed are sufficient for purchase of material.

We are working on finalizing vane details for the divider walls, small egg crates, and south/north levels 2 & 3 depicted on model schematics 6, 9-14. I will forward these to you upon completion later this week.

CODE

1	FOR REVIEW	4	FOR COMMENT
2	FOR ISSUE	5	FOR MANUFACTURE
3	FOR INFORMATION	6	OTHER

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P.O. Box 410
Pluckemin, New Jersey 07978
Phone. 908-470-0470, FAX: 908-470-0479

DRAWING TRANSMITTAL

CONTRACT 04-45606 AS BUILTS – Windbox Turning Vanes AUGUST 26, 2004

TO: Phil Hailes
FROM: Sal Ferrara

CODE	DRAWING NUMBER	REV	DRAWING TITLE
2,3	03008-800-A06-0	1	WINDBOX BAFFLE ARRANGEMENTS
2,3	03008-800-A06-D01	1	WINDBOX BAFFLE F
2,3	03008-800-A06-D04	1	WINDBOX BAFFLE D & E
2,3	03008-800-A06-D05	1	WINDBOX BAFFLE C
2,3	03008-800-A06-D06	1	WINDBOX BAFFLE A & B

NOTE: Enclosed for your records are the listed drawings of the windbox turning vanes and baffles. These drawings were revised to depict the arrangement as installed during the March 2004 Outage.

CODE

1	FOR REVIEW	4	FOR COMMENT
2	FOR ISSUE	5	FOR MANUFACTURE
3	FOR INFORMATION	6	OTHER

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 11/26/2003 5:23:34 AM
Subject: IPSC Contract 04-45606, CFD Model

Phil,

See attached letter containing questions we have regarding input to the model. Please advise answers so we can complete the model.

Regards,

Sal

P.S.:

Regarding your question on burner rotations shown on our arrangement drawings 03008-100-A01-FW & -RW, we are changing the rotations from the OEM's. It is our experience that the rotation scheme we have shown works well and we believe it provides the best mixing.

CC: "James Nelson" <JIM-N@ipsc.com>, "Joe Malone" <joe@advancedburner.com>, "Chuck Onaitis" <chuck@advancedburner.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "James Nelson" <JIM-N@ipsc.com>
Date: 3/12/2004 1:57:13 PM
Subject: IPSC Contract 04-45606, WB Model Results

James,

Attached is ASC windbox flow model report discussing the baseline and comparing it to the final design run. The report includes the color plots for the final design run only, so I am also attaching the color plots of the baseline condition for your comparison. The schematic of the windbox modifications are also attached for your information (the detail drawings we sent earlier this week followed these schematics). Note that in the baseline we found that the misdistribution in each of the burner windboxes were similar in which case we only needed to continue modeling of a single windbox to determine final design to be duplicated for all of the burner windboxes.

The model shows that significant improvement in the air flow balance across the burner windboxes will be achieved with the modifications. We recommend that these be implemented during the current outage in that it will improve burner to burner flow distribution, which in turn will help to maximize combustion performance during optimization.

Please review and we will call you to discuss any questions.

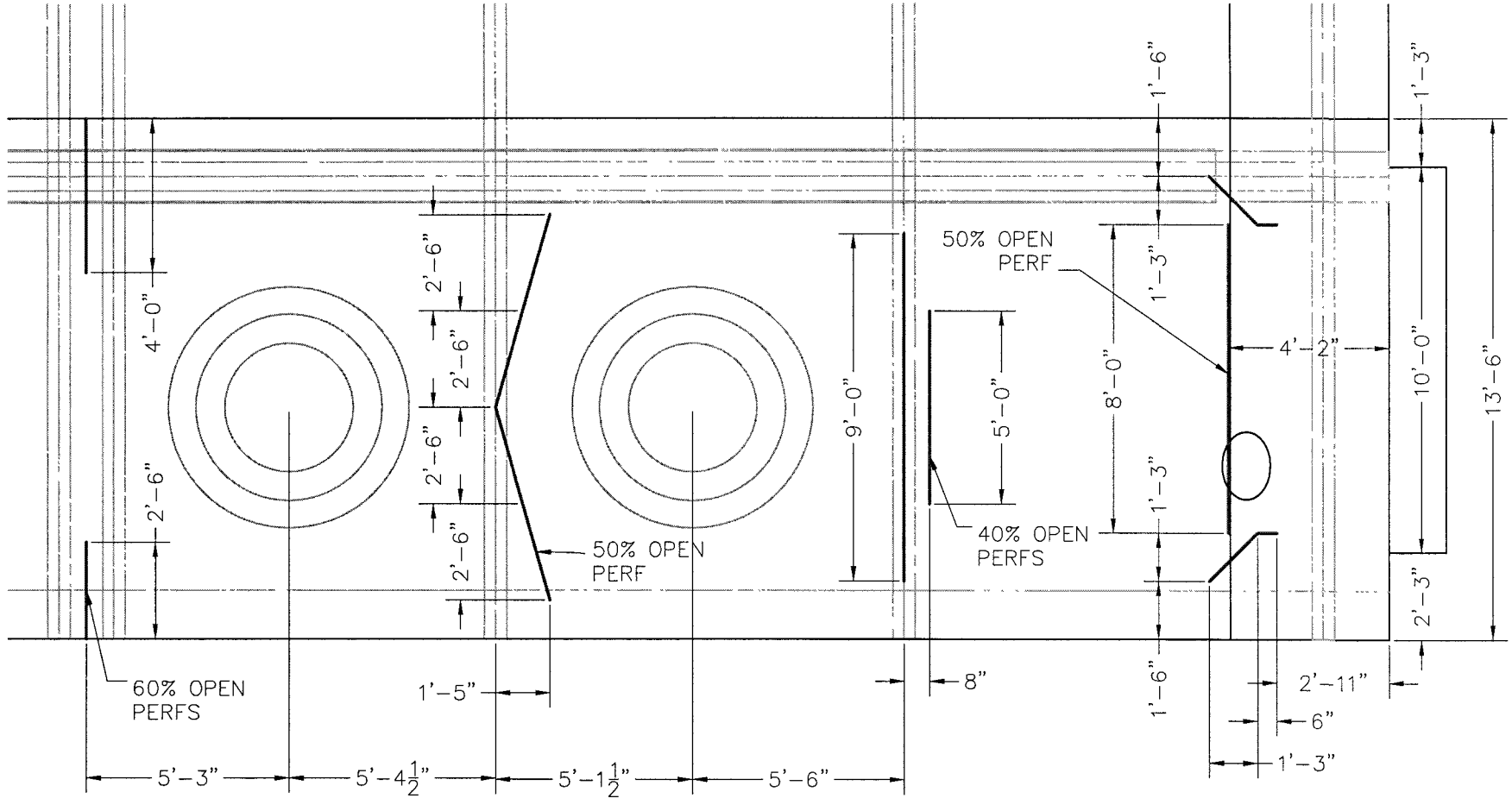
Regards,

Sal

CC: "Phil Hailes" <Phil-H@ipsc.com>

Windbox Perforated Plate Schematics

ABT Design 4 - Side View - Bottom Windboxes



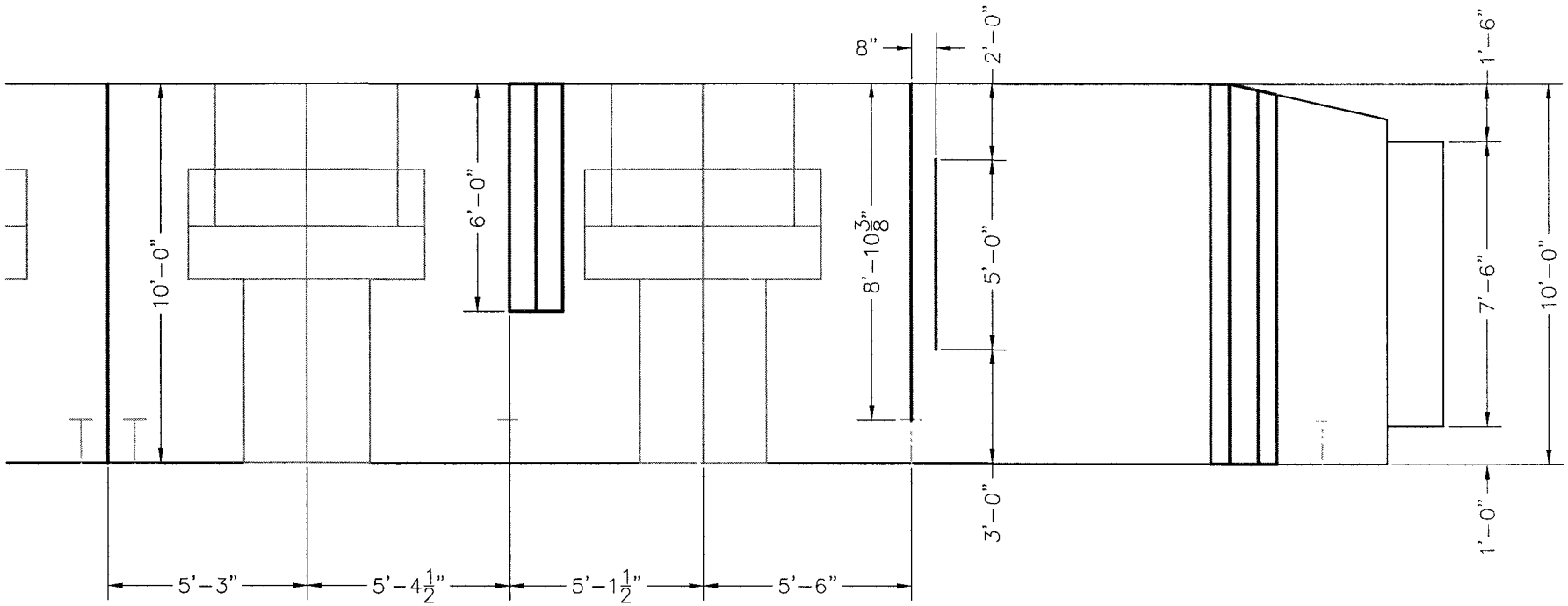
IP7_030264

Figure 1

Airflow Sciences Corporation

Windbox Perforated Plate Schematics

ABT Design 4 - Top View - Bottom Windboxes



IP7_030265

Figure 2

Airflow Sciences Corporation

ADVANCED BURNER TECHNOLOGIES

271 Route 202/206
P.O. Box 410
Pluckemin, NJ 07978 USA
Phone: 908-470-0470
FAX: 908-470-0479

Diagnostic Test Report

for

Opti-Flow™ Low NO_x Burners

on
Intermountain Power Service Corporation

Delta Unit 2

August 20, 2004

1.0 Introduction

Advanced Burner Technologies
271 Route 202/206 P.O.Box 410
Pluckemin, NJ 07978 USA

Intermountain Power Service Corporation (IPSC) Delta Unit 2 is a B&W pulverized coal, supercritical boiler rated at 6,900,000 pounds of steam per hour. This unit fires western bituminous coal originally using 48 OEM dual register low NO_x burners. NO_x emissions with those burners were typically in the range between 0.4 and 0.45 lb/10^6 Btu at full load. Intermountain Unit 2 was retrofitted with 48 ABT's Opti-Flow™ Low NO_x burners during the March 2004 outage. In addition, secondary air duct/windbox turning vanes and baffles were designed and installed in the windboxes in order to correct the existing air mal-distribution and instabilities within each windbox. Modifications to install the secondary air duct vanes and baffles are to be implemented by IPSC during the next outage.

ABT has demonstrated operating NO_x levels at full load to be below 0.33 lb/10^6 Btu with 48 Opti-Flow™ low NO_x burners and one mill out of service; with overfire air port closed.

The purposes of the retrofit are:

1: Minimize NO_x without detrimental effects on boiler performance, reliability and efficiency. ABT guarantees that NO_x will not exceed 0.33 b/10^6 Btu, with overfire air ports closed, at the design excess air of Proposal Section 4.6 and 100% MCR. ABT predicts that NO_x with OFA ports open, with a flow of 20% of the total combustion air, will be less than 0.25 lb/MBtu. NO_x is a function of several fuel variables, primary among them is fixed carbon to volatile matter (FC/VM) ratio and % fuel-bound nitrogen. Figure 1 represents the change in NOx guarantee parametrically in FC/VM against fuel nitrogen content as lb. N_2/10^6 Btu.

Note: The guarantee point represents the fuel properties specified in Proposal Section 4.9: 1.2% N_2 and 11.500 Btu/lb corresponds to 1.04 lb N_2/10^6Btu.

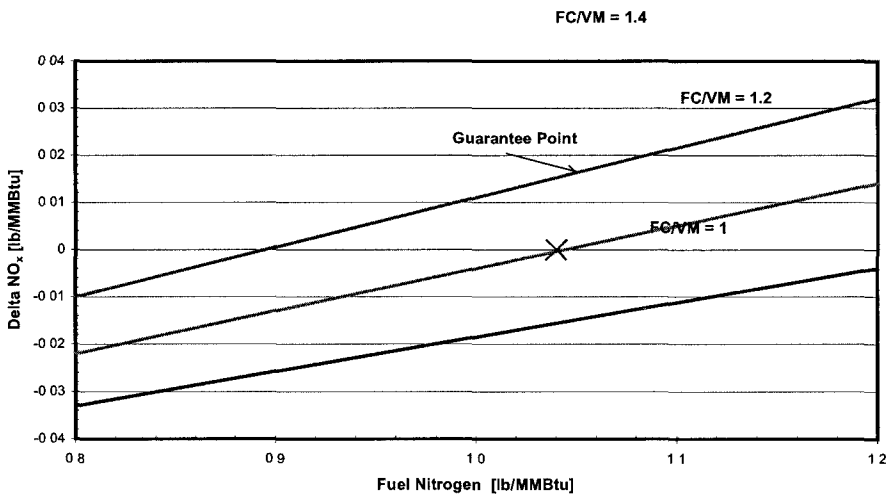


Figure 1 Change in NOx vs. Fuel Properties

2 : Other guarantees

CO will not exceed an average of 200 ppm, with overfire air ports closed. LOI will not exceed the values obtained in pre-outage baseline testing; with overfire air ports closed with no more than 5% leakage/cooling air flow.

Boiler performance will not be deteriorated from the performance obtained during the baseline tests. Commercially acceptable variations in individual measured data will be acceptable (i.e., super heat temperature ± 10° F, etc.).Boiler efficiency will not be lower than the baseline measurements, corrected for excess air and fuel conditions.

3: Burner Optimization

ABT field service engineers spent 9 days (May 18-26, 2004) assisting plant engineers in tuning IPSC Unit 2 in order to minimize CO. The goal of this tuning was to find one set of burner setting for all mill configurations to meet the CO and NOx limit.

IPSC installed turning vanes and perforated plate inside burner windboxes based on Air Flow Sciences (ASC) model, however there was insufficient time available to install the recommended turning vane arrangement in secondary air supply ducts. Currently the bottom level burners are starved for secondary air. DCS data shows the bottom windbox duct pressure is only 50-60% of the average of the other 3 decks for both front and rear walls as shown in Fig 2.

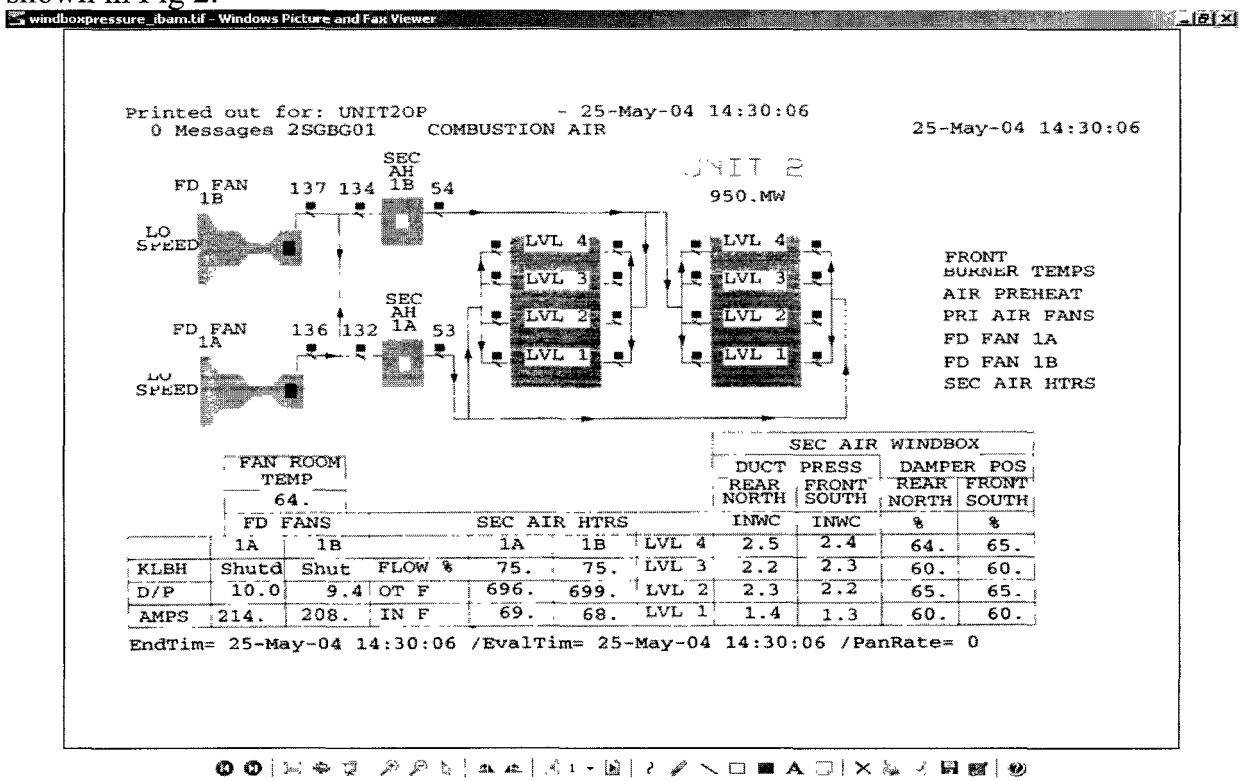


Fig 2 Secondary Air Windbox Pressure

During the testing the fuel quality changed. In Fig 3 the SO2 changed frequently indicating the change of fuel, and the NOx followed the change.

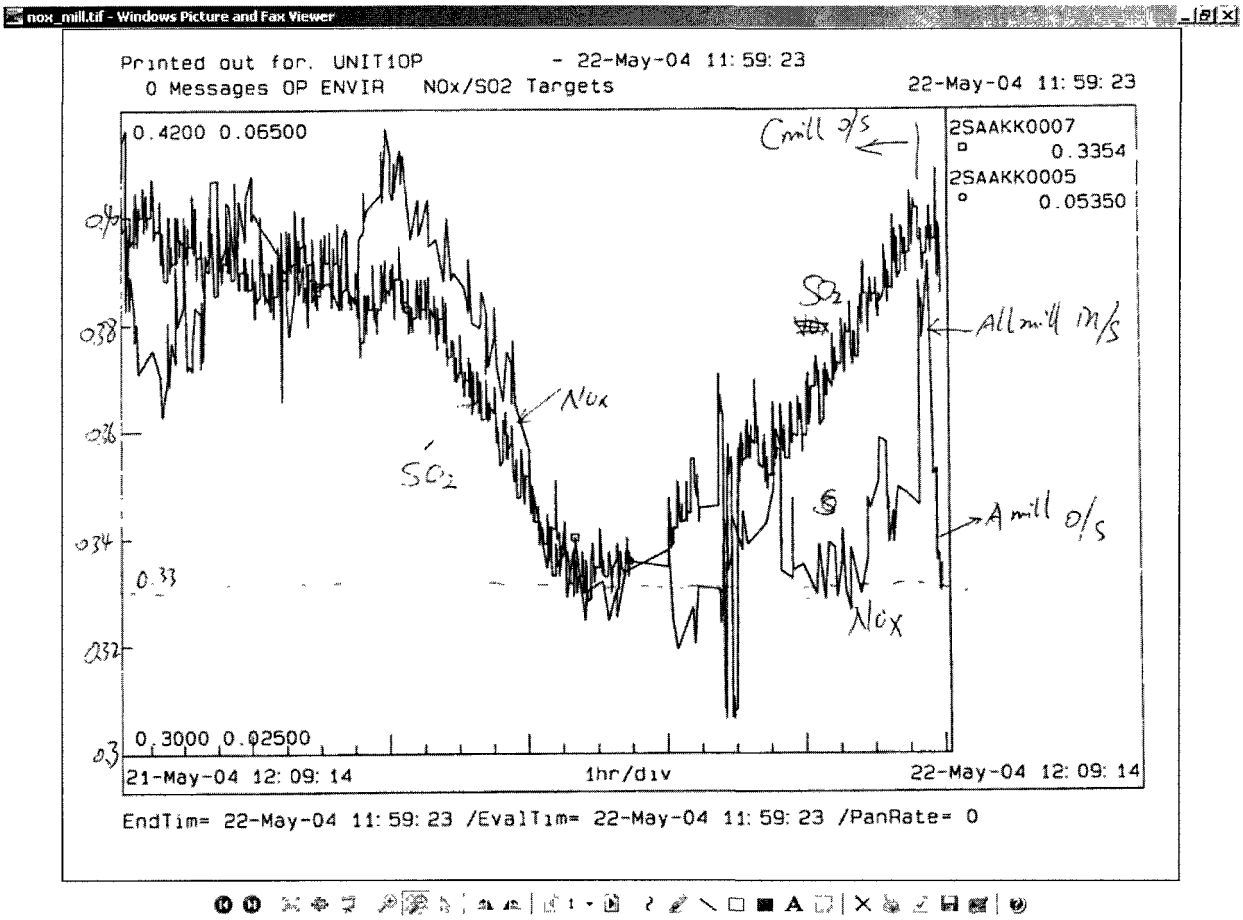


Fig 3 Sulfer Content Changes Indicate Fuel Change

Both sides SA damper control signals are linked, operators can not control west and east SA damper individually which hampers ability to achieve optimum windbox balance.

The gas damper for reheat steam temperature control could redirect the exit gas streamline making it difficult to correlate measured exit gas emissions data to burner location. Also test tap 4 point 4 may have some leakage since the O2 is always high for that probe.

Several Pulverizers require maintenance. Some have differential pressure above 15" WC, this was noted on pulverizers A,C, and E on May21st. Only H mill's differential pressures was noted below 10" WC for all test days.

There were only 2 gas analyzers for CO/O2 (NO_x analyzer not available). The grid was setup according to ASME standard, however with this setup it is difficult to correlate grid data to specific burner columns. Also extracting data from the grid was time consuming with it taking over an hour to generate a test profile with readings fluctuating constantly.

NOx, LOI, and CO data recorded during ABT test period are summarized in Table 1.

Table 1: LOI and NOx for IPSC Unit2

Time	Nox (cem)	LOI	O2	CO
16-May	0.28	3.5	X	X
17-May	0.26	3.45	X	X
18-May	0.32	4.4	3.23	206.00
19-May	0.29	1.1	3.30	104.00
20-May	0.26	2	3.50	250.00
21-May	0.335	3.75	3.01	206.50
22-May	0.33	3.9	3.36	276.00
23-May	0.34	3.2	3.61	304.00
24-May	0.26	2.6	3.41	281.00
25-May	0.325	X	3.28	304.50
26-May	0.327	X	3.27	157.00

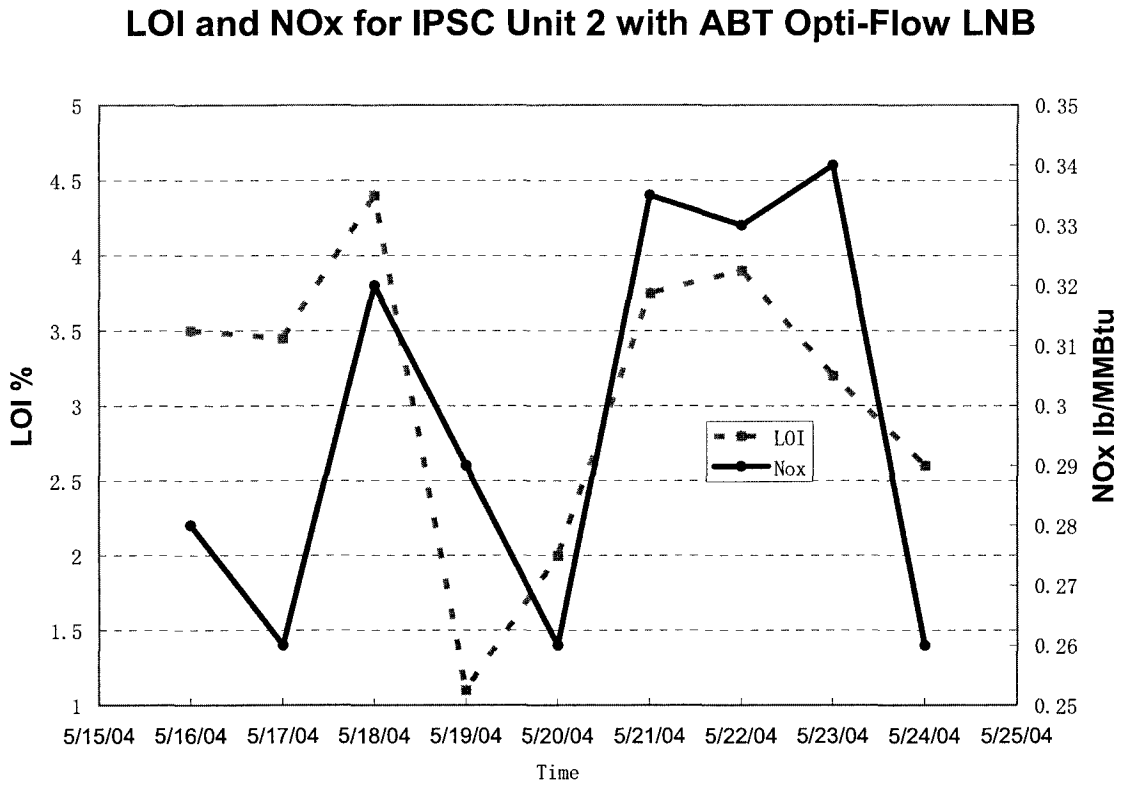


Fig 4 LOI and NOx for IPSC Unit2, Fuel Changed on May 21st

Testing grids were installed according to ASME standard.

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CO and O2 data for all tests (IPSC & ABT test periods) are summarized in Table 2.

Table 2: Overall CO and O2 for All Tests

Testing time	Ave. Grid O2	Ave. Grid CO
April 27 All I/S	3.34	33.395
April 27 All I/S	3.67	17.105
April28 C O/S	3.78	380.49
April28 D O/S	3.695	200.315
April29 E O/S	3.19	662.525
April29 A O/S	3.055	537.015
April30 H O/S	3.52	172.555
April30 H O/S	3.805	69.145
May 3 G O/S	2.985	830.835
May 3 G O/S	3.21	649.025
May 3 G O/S	3.335	595.9
May 4 B O/S	2.99	743.325
May 4 D O/S	3.15	691.06
May 4 D O/S	3.925	395.94
May 7 F O/S	3.48	614.3
May18All I/S	3.23	206
May19All I/S	3.3	104
May20 F/O	3.5	250
May21 All I/S	2.98	164
May21 C O/S	3.04	249
May22 C O/S	3.08	422
May22 A O/S	3.64	130
May23 H O/S	3.42	317
May23 H O/S	3.68	323
May23 H O/S	3.73	272
May24 A O/S	3.41	281
May25 All I/S	3.26	317
May25 All I/S	3.09	357
May25 All I/S	3.37	341
May25 All I/S	3.38	203
May26 All I/S	3.3	173
May26 All I/S	3.23	141

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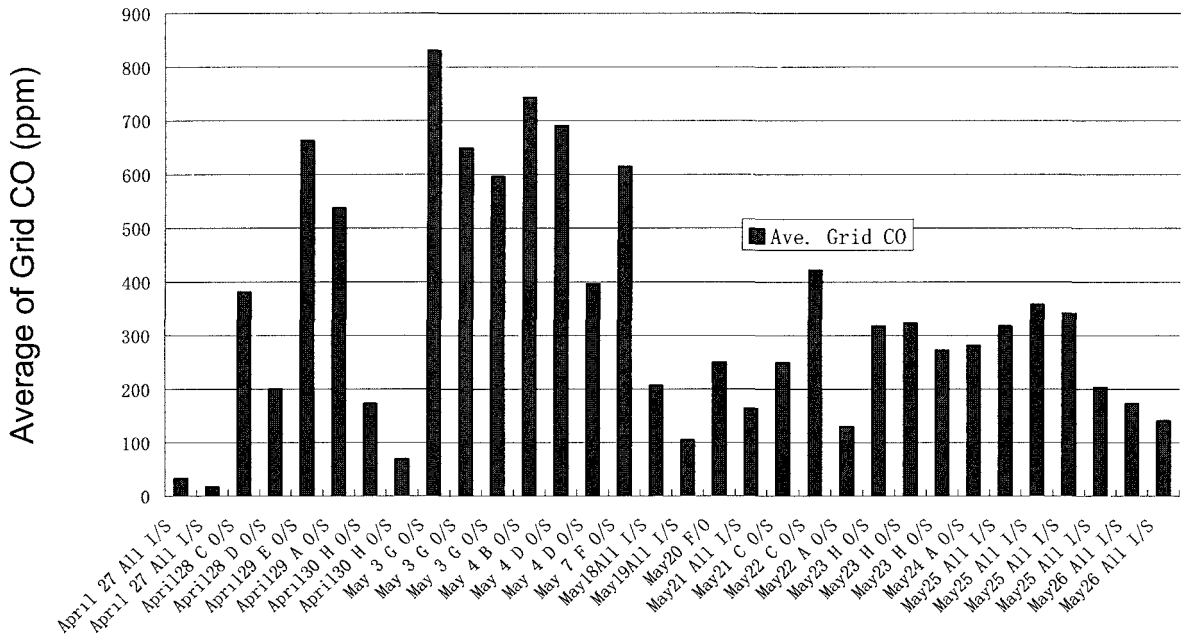

Fig 5 Overall CO

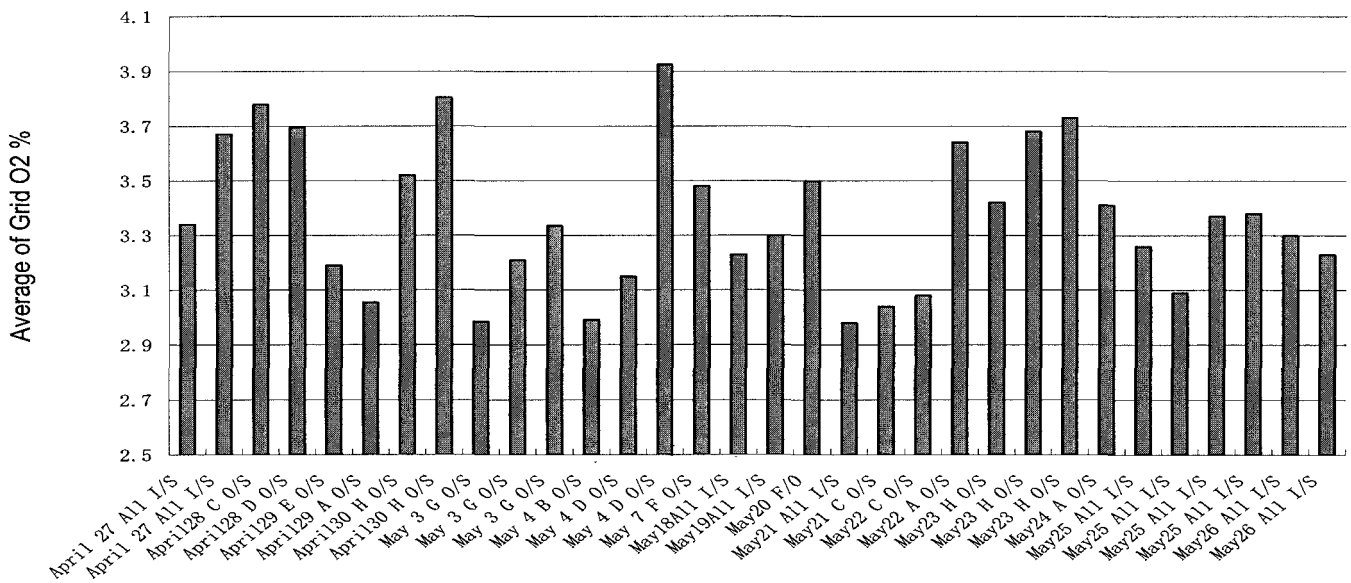

Fig 6 Overall O2

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Conclusions:

1. Testing shows that NOx can be controlled on a daily basis below the guarantee 0.33lb/MMBtu.
2. CO can be maintained under 200ppm with all mills in service. Burner settings determined from the 9 days of ABT testing resulted in considerable reduction in the CO emissions, under the various mill out conditions. The optimization process illustrated during the testing was successful in isolated burners that were main contributors to CO formation. Adjusting component settings on these specific burners improved their flames and resulted in reduction in CO emissions on the boiler.
3. Use of a professional testing company would assist ABT field engineers with timely test information in a profile correlated to burner location. This should result in further reductions in the average CO emissions on a daily basis.
4. Installing ABT designed turning vane modifications inside of SA supply ducts will improve flow distribution to bottom level burners. This is key to further reductions in CO emissions for the worst case mill out configurations.
5. Maintaining the coal quality as constant as possible will facilitate obtaining repeatable results during future optimization testing.
6. Unlinking the control signal between east and west side SA dampers will allow greater flexibility to bias the east/west side secondary air, which should help optimize windbox air balance.
7. Performing maintenance on the mills will further improve combustion performance. We are not able to comment on the affect the primary air system has on the emissions in absence of test data related to burner line balance, mill coal fineness, and coal analyses.
8. Installation of additional pressure probes inside existing windboxes test ports on each of the levels would allow measuring of the pressure distribution across the windbox.

Detail test results and burner settings are provided in the Appendix

Appendix

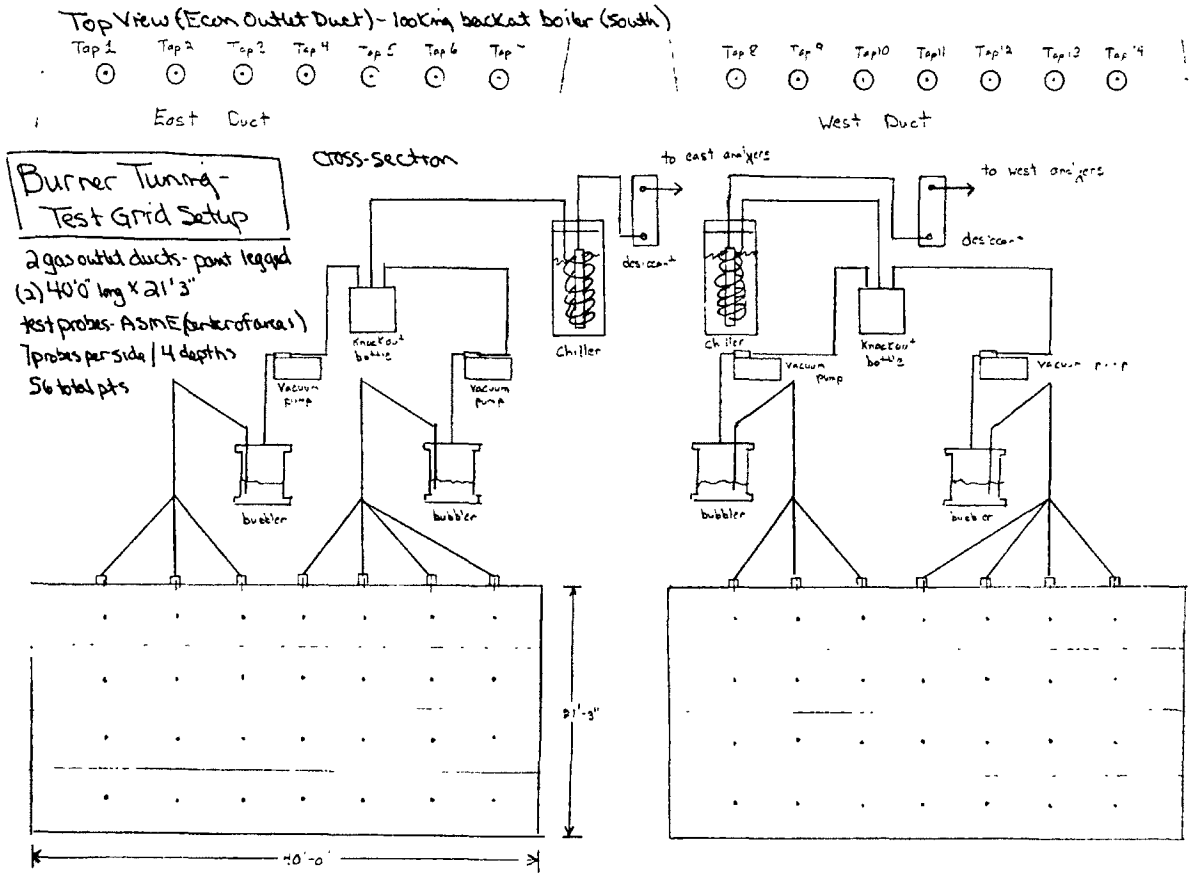

Fig 1 Grid Arrangement for CO and O2

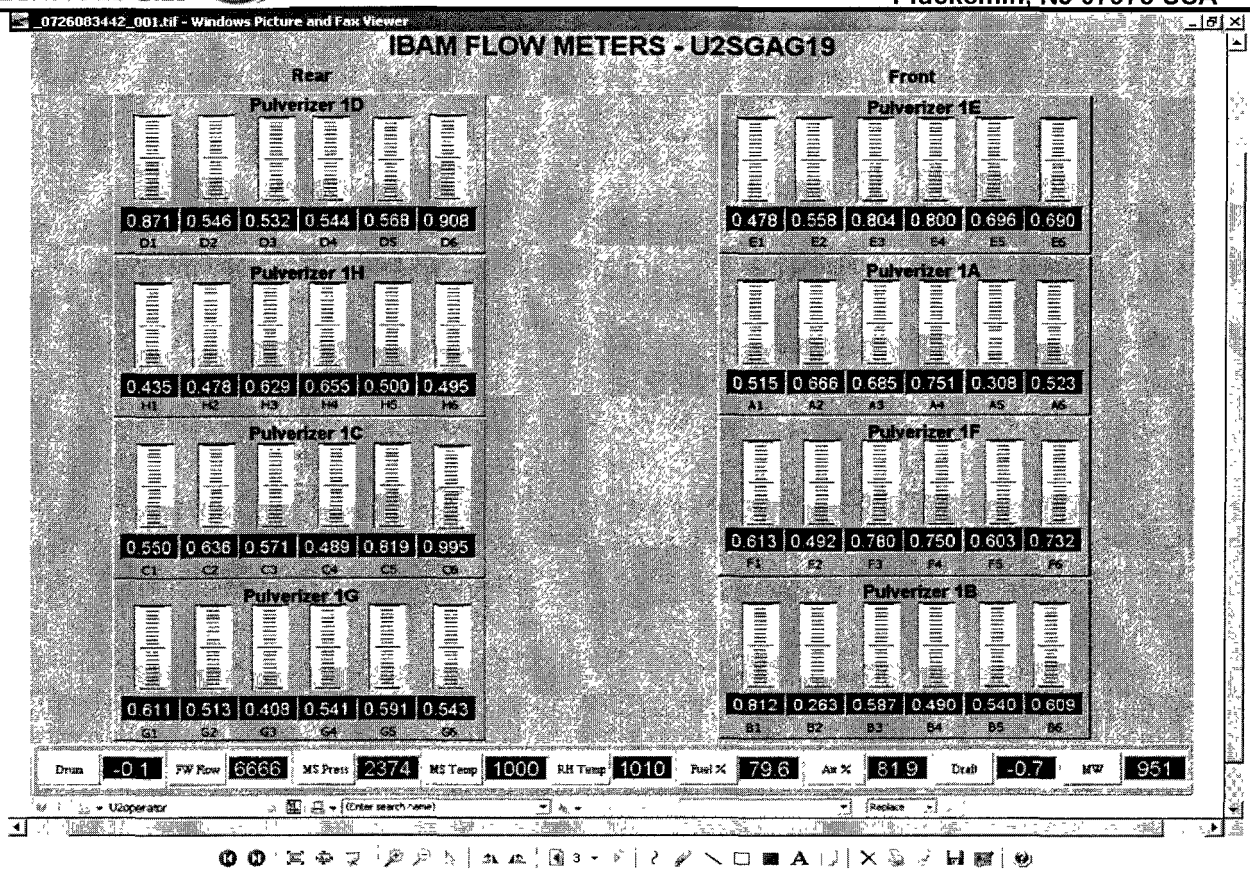

Fig 2 IBAM screen print

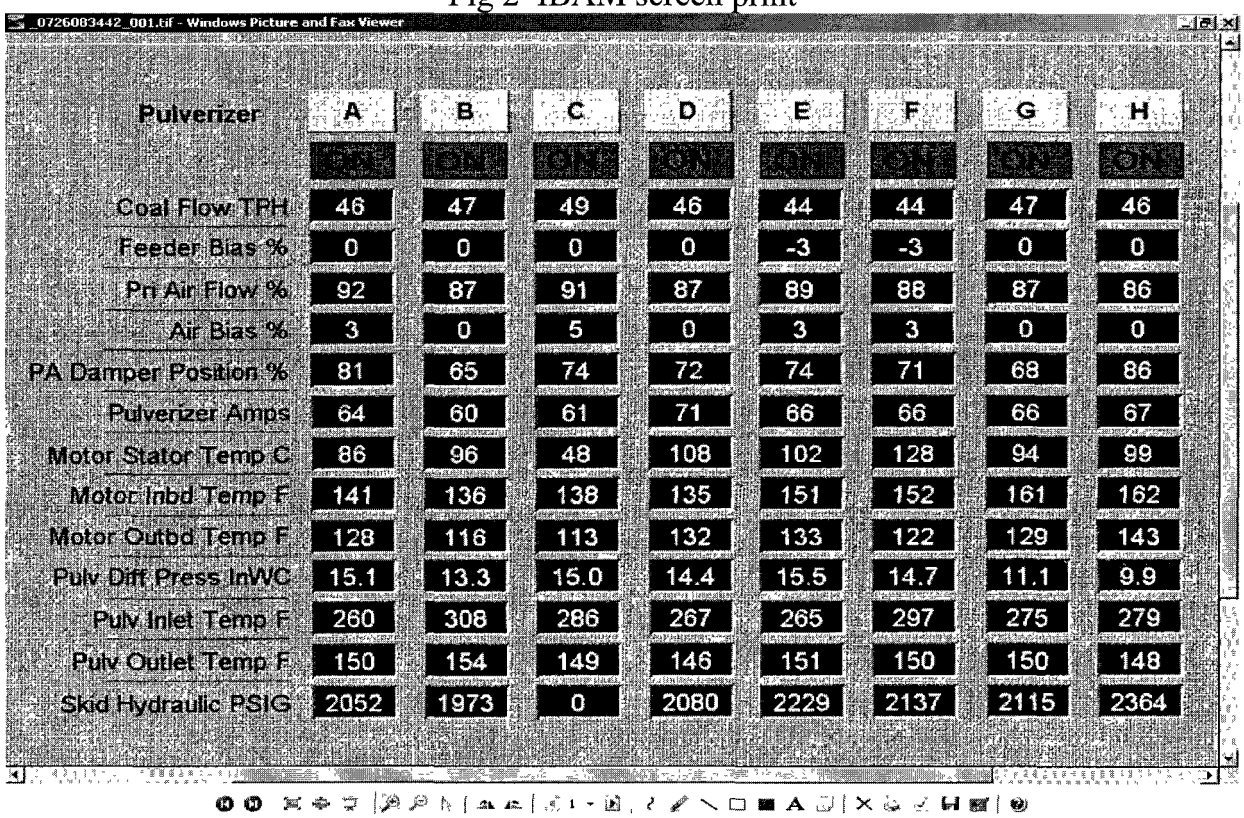

Fig 3 Pulverizer Operation Condition

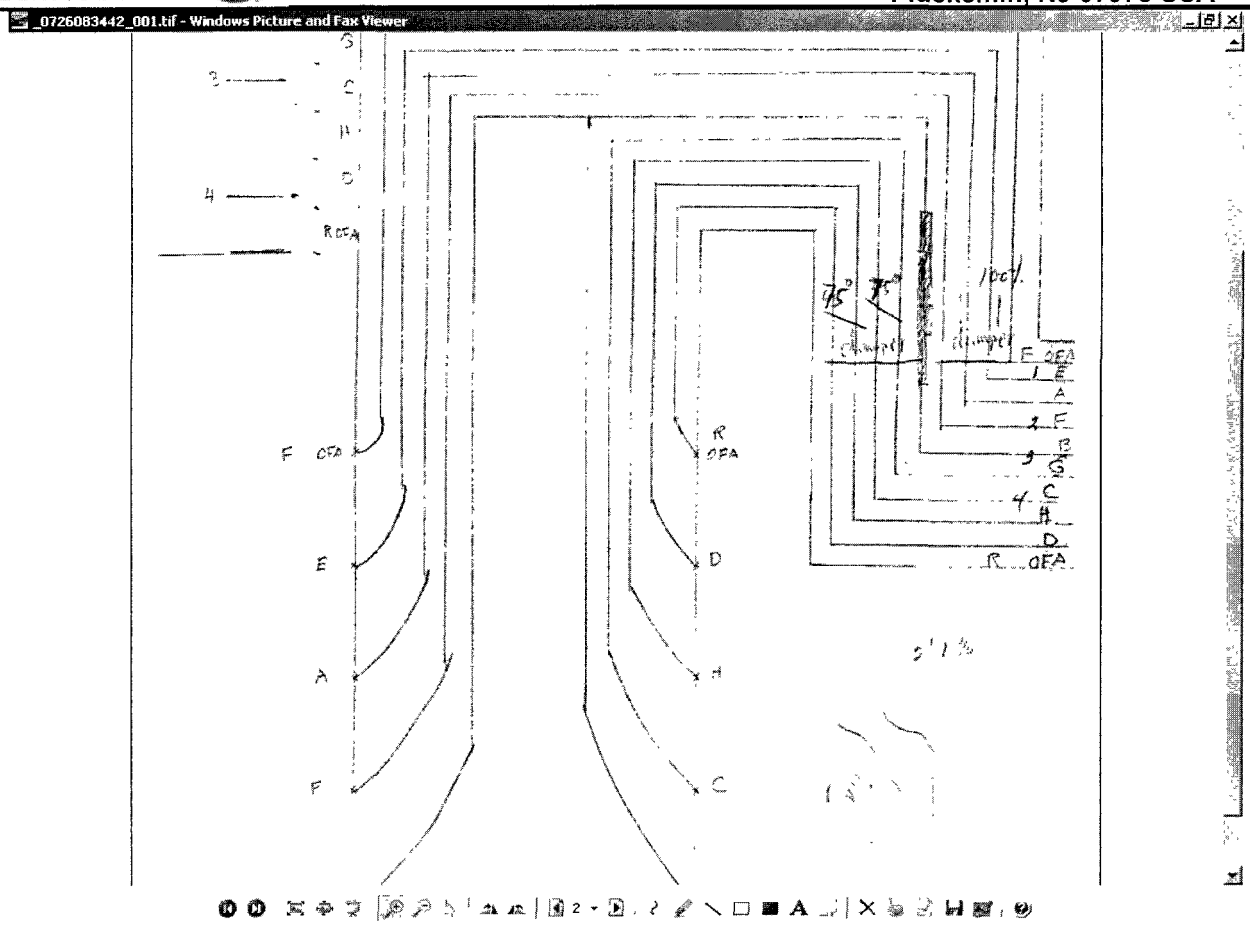

Fig 4 Burner Layout and Streamline

Testing Log summary:

Table 1: LOI and NOx for IPSC Unit2

Time	Nox (cem)	LOI	O2	CO
16-May	0.28	3.5	X	X
17-May	0.26	3.45	X	X
18-May	0.32	4.4	3.23	206.00
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22-May	0.33	3.9	3.36	276.00
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24-May	0.26	2.6	3.41	281.00
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Table 2: Overall CO and O2 for All Tests

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April29 E O/S	3.19	662.525
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May 3 G O/S	3.21	649.025
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May 7 F O/S	3.48	614.3
May18All I/S	3.23	206
May19All I/S	3.3	104
May20 F/O	3.5	250
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May22 C O/S	3.08	422
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May23 H O/S	3.68	323
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May25 All I/S	3.26	317
May25 All I/S	3.09	357
May25 All I/S	3.37	341
May25 All I/S	3.38	203
May26 All I/S	3.3	173
May26 All I/S	3.23	141

Test on May 18th: The burner settings were as follows:

Table 3: Burner Settings on May 18th 2004

UNIT 2			Spin Vanes	Inner Air	R7-5/17/04 Outer Register	R8-5/18/04 Outer Register
Front	Pulv	E1	3.00	1.5	6.5	6.3
		E2	3.00	1.5	5.4	5.1
	min	E3	3.00	1.5	5.0	4.6
	E	E4	3.00	1.5	5.1	4.7
		E5	3.00	1.5	5.7	5.3
		E6	3.00	1.5	6.8	6.6
	Pulv	A1	3.75	1.5	8.7	8.5
		A2	3.75	1.5	7.3	6.8
	A	A3	3.75	1.5	6.6	6.1
		A4	3.75	1.5	6.9	6.3
		A5	3.75	1.5	7.6	7.0
		A6	3.75	1.5	9.2	8.9
	Pulv	F1	3.25	1.5	6.8	6.5
		F2	3.25	1.5	5.6	5.3
	F	F3	3.25	1.5	5.1	4.7
		F4	3.75	1.5	5.3	4.8
		F5	3.75	1.5	5.9	5.4
		F6	3.75	1.5	7.1	6.9
	Pulv	B1	3.75	1.5	10.3	10.0
		B2	3.75	1.5	8.6	8.0
	B	B3	3.75	1.5	7.8	7.2
		B4	3.75	1.5	8.1	7.4
		B5	3.75	1.5	8.9	8.3
		B6	3.75	1.5	10.8	10.5
			Spin Vanes	**Inner Air**	5/17/04 Outer Register	5/18/04 Outer Register
Rear	Pulv	D1	3.75	1.5	7.3	**7.1**
		D2	3.75	1.5	6.1	**4.7**
	D	D3	3.75	1.5	5.5	**4.0**
		D4	3.75	1.5	5.7	**4.5**
		D5	3.75	1.5	6.3	**6.3**
		D6	5.00	1.5	7.6	**10.3**
	Pulv	H1	3.00	1.5	9.4	9.1
		H2	3.00	1.5	7.8	7.3
	H	H3	3.00	1.5	7.1	6.6
		H4	3.00	1.5	7.3	6.7
		H5	3.00	1.5	8.1	7.5
		H6	3.00	1.5	9.8	9.5
	Pulv	C1	3.75	1.5	8.3	8.1
		C2	3.75	1.5	7.0	6.5
	C	C3	3.75	1.5	6.3	5.9
		C4	3.75	1.5	6.5	6.0
		C5	3.75	1.5	7.2	6.7
		C6	3.75	1.5	8.8	8.5
	Pulv	G1	3.75	1.5	12.7	12.3
		G2	3.75	1.5	10.5	9.9
	G	G3	3.75	1.5	9.6	8.9
		G4	3.75	1.5	9.9	9.1
		G5	3.75	1.5	11.0	10.2
	max	G6	3.75	1.5	13.3	12.9

CO profile is shown as Fig 5.

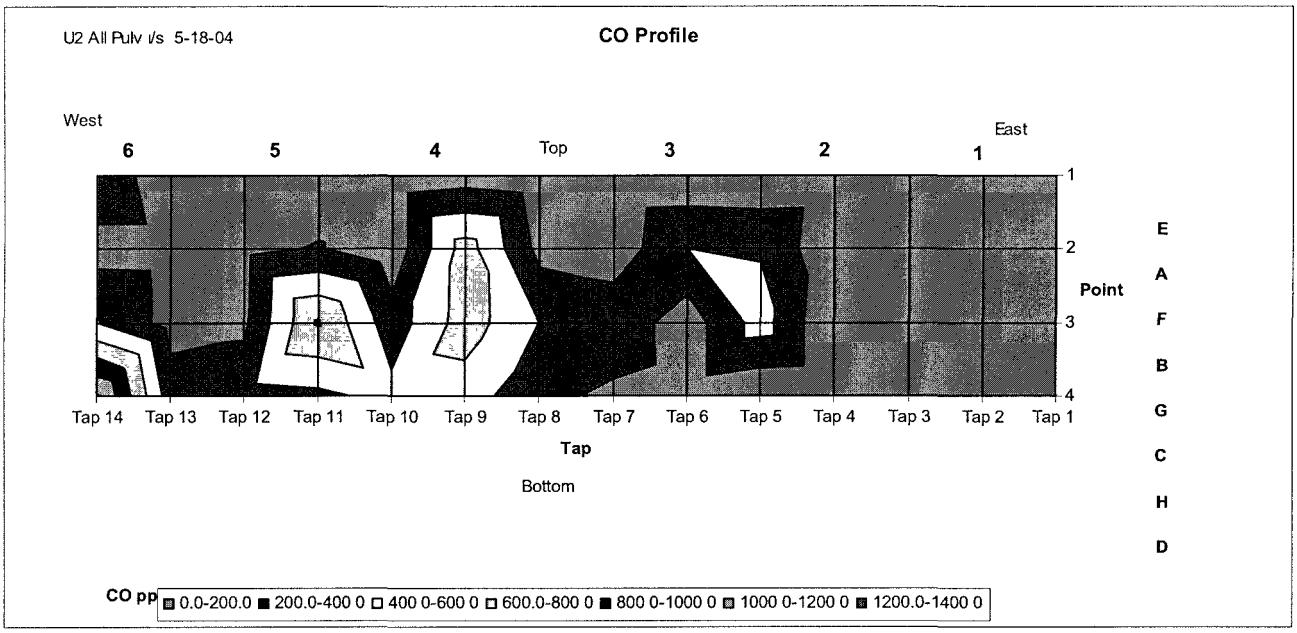


Fig 5 CO Profile 2D

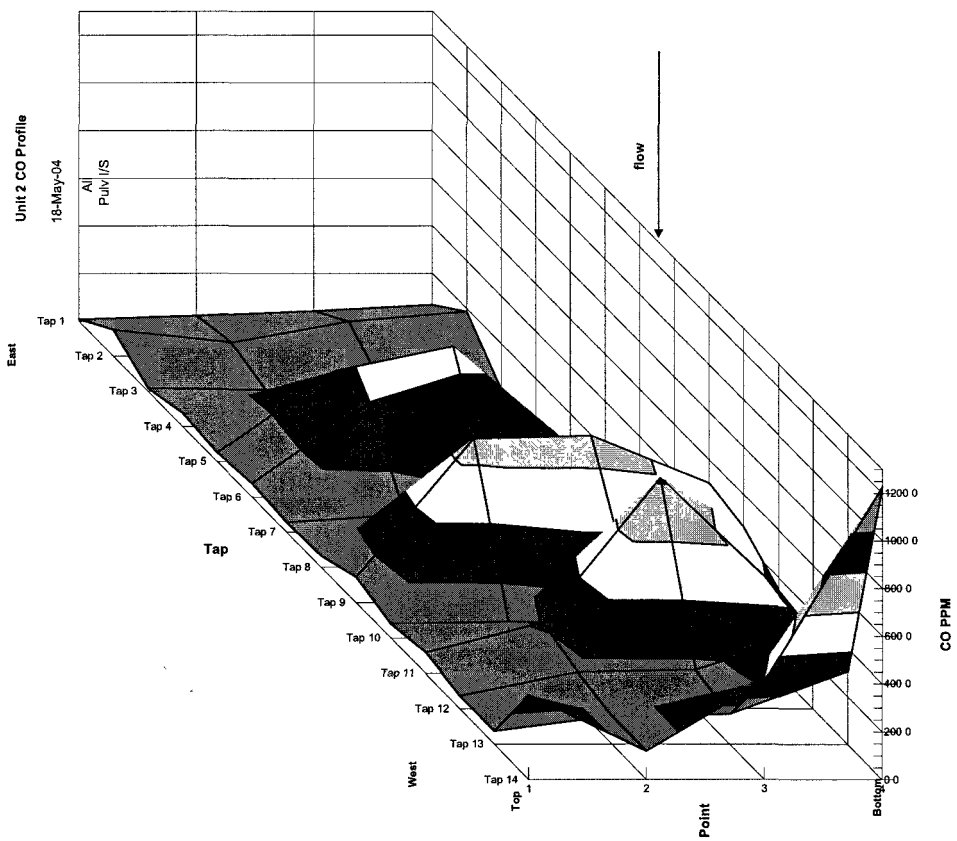


Fig 6 CO Profile 3D

O2 profile is shown as following:

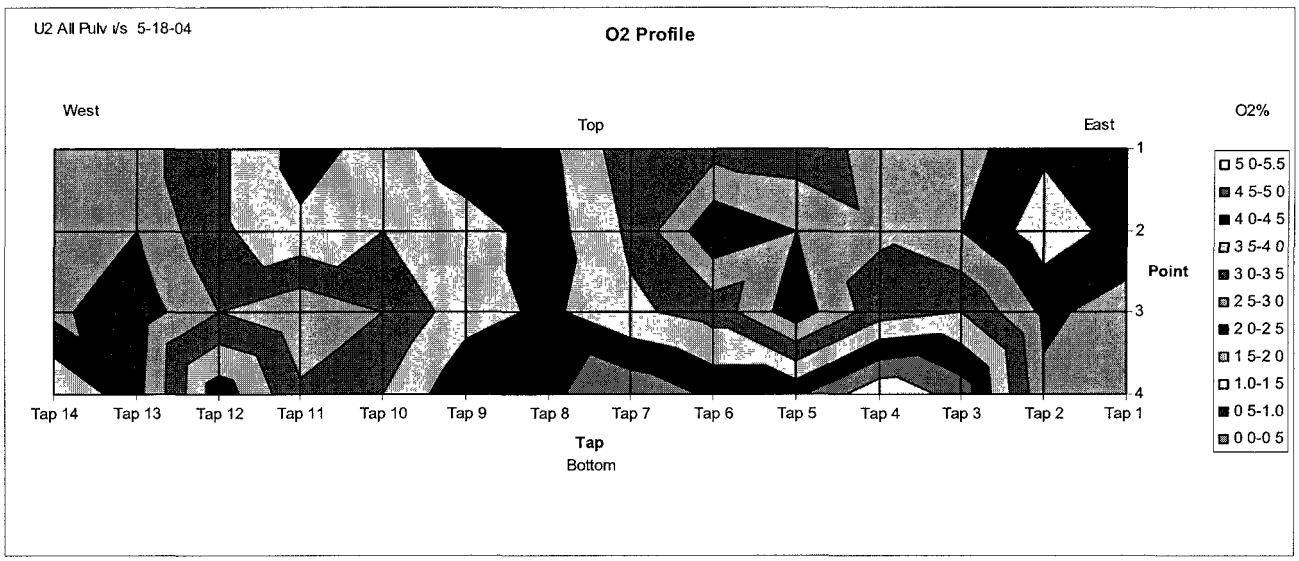


Fig 7 O2 Profile 2D

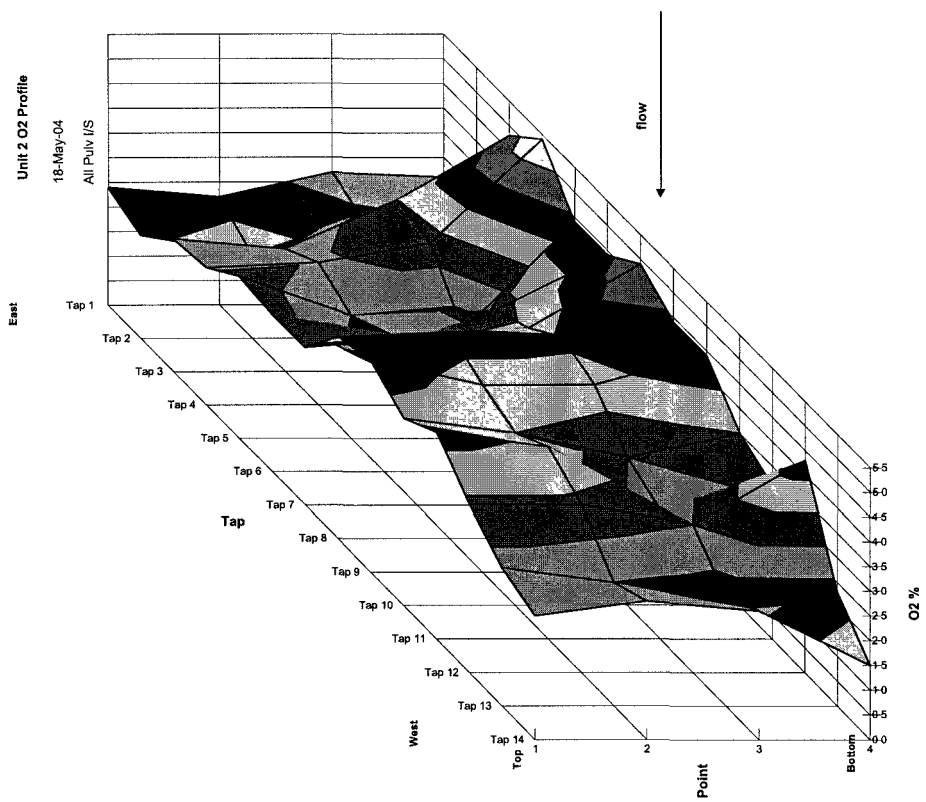


Fig 8 O2 Profile 3D

Analysis:

High CO at the corner may be caused by the burner D6. ABT field engineers suggested opening D6 outer register from 7.6 to 10.3, close D1 D2 D3 D4 to 7.1, 4,7, 4,0, 4,5 respectively. After these changes D6 flame was significantly improved. CO dropped from 206 to 104 ppm.

The profiles recorded are as follows:

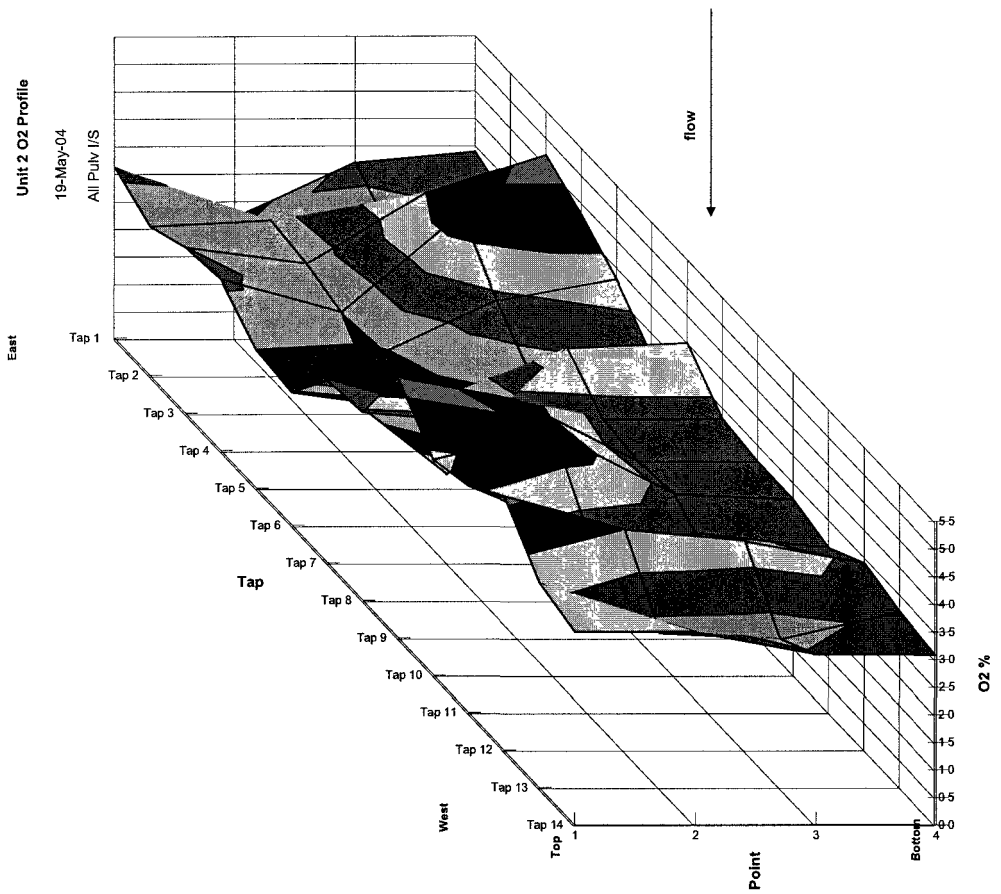


Fig 9 O2 Profile 3D

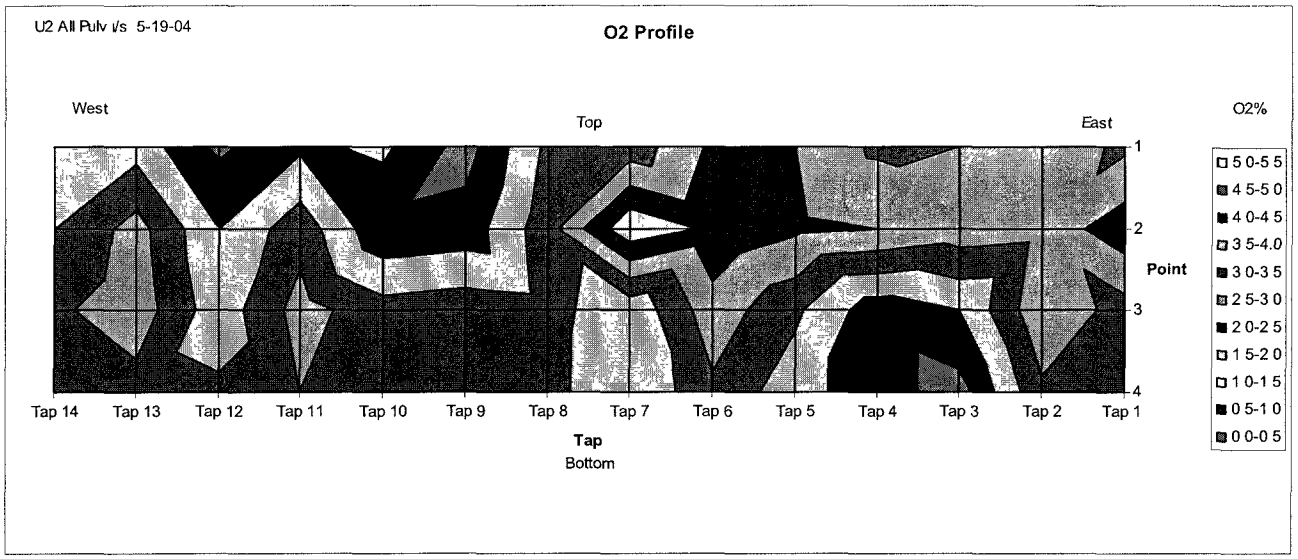


Fig 10 O2 Profile 2D

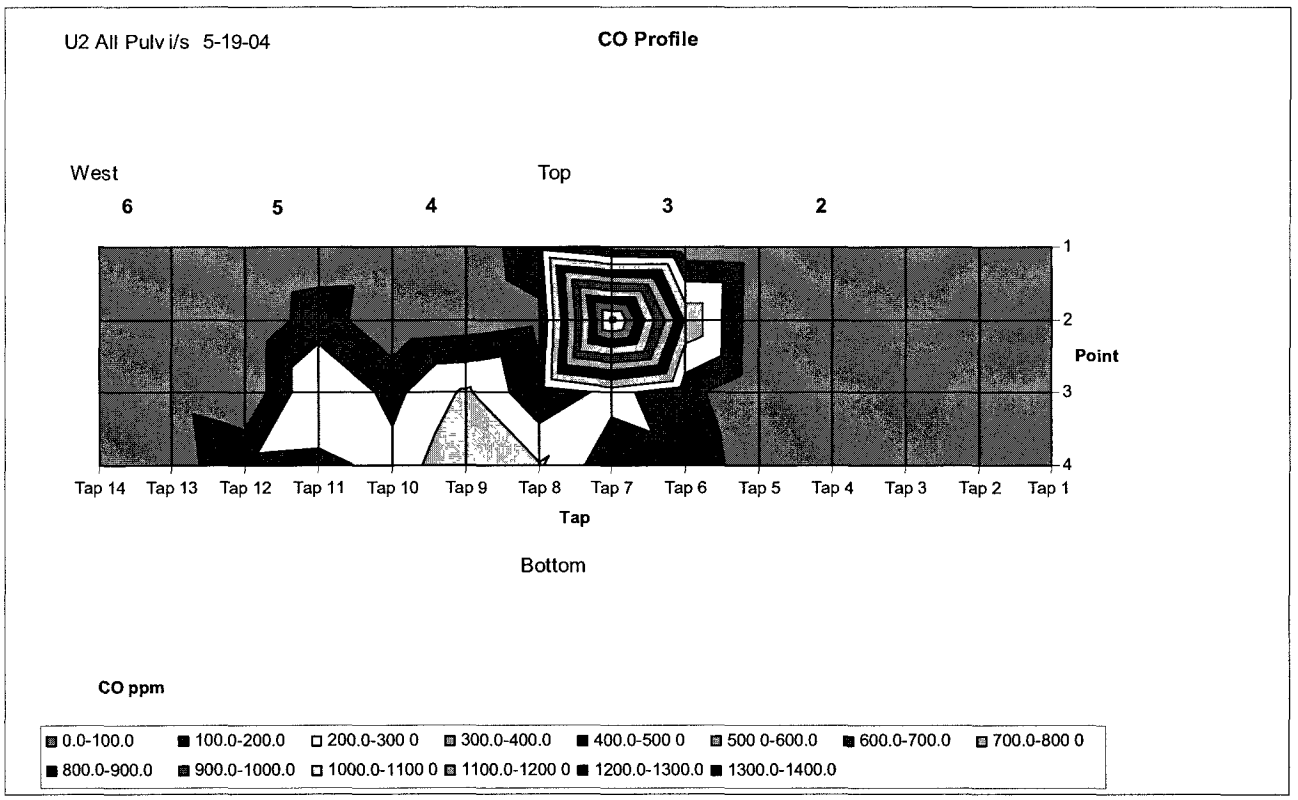


Fig 11 CO Profile 2D

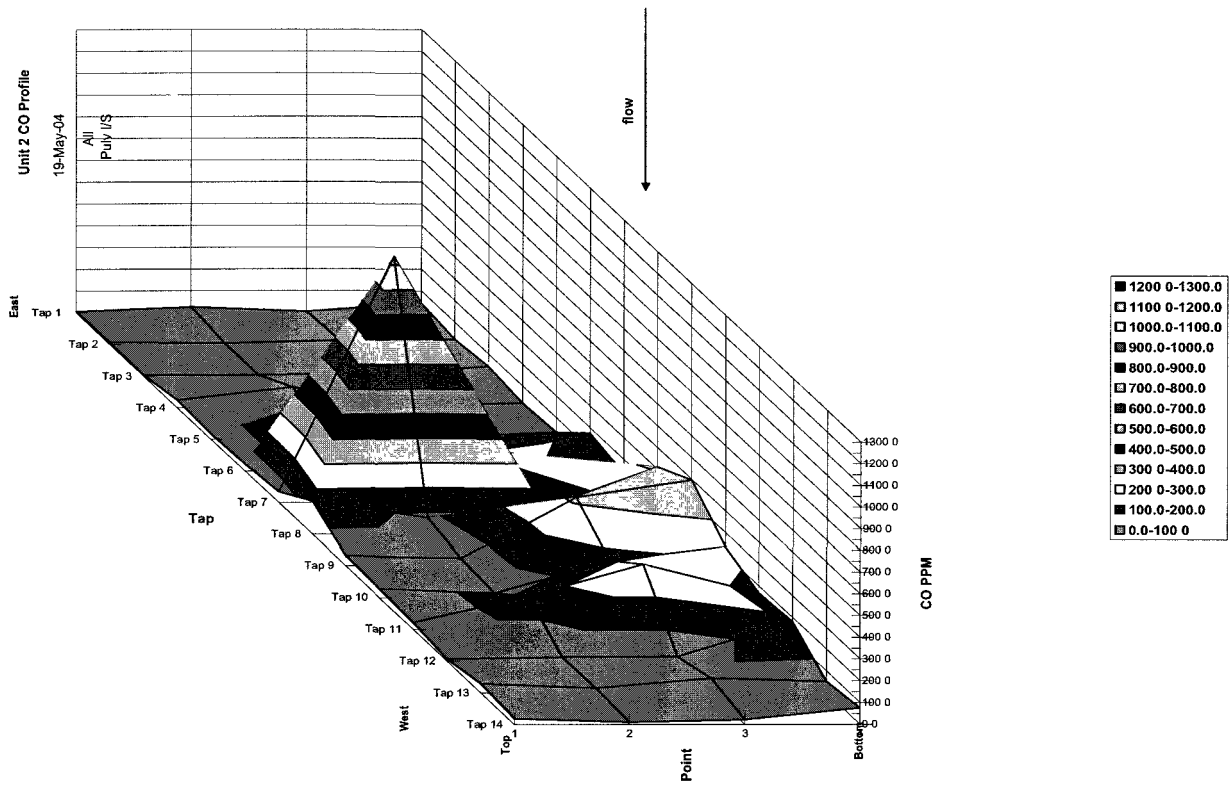


Fig 12 CO Profile 3D

May 20th F Mill O/S
ABT field service engineers and power plant engineers opened some spin vane to let more air go through to kill the high peak CO in last profile. From the results it seems we overacted. The CO in the center is low and west side is higher.

F mill had some problems and was O/S.

Table 4 Burner Settings on May 19th 2004

UNIT 2								
			Spin Vanes	Inner Air	5/18/04 Outer Register	Spin Vanes	Inner Air	5/19/04-5/20/04 Outer Register
Front	Pulv	E1	3.00	1.5	6.3	3.75	1.5	6.5
		E2	3.00	1.5	5.1	3.75	1.5	5.3
	min	E3	3.00	1.5	4.6	3.75	1.5	4.7
	E	E4	3.00	1.5	4.7	4.50	1.5	4.8
		E5	3.00	1.5	5.3	3.75	1.5	5.4

		E6	3.00	1.5	6.6	3.75	1.5	6.6
	Pulv	A1	3.75	1.5	8.5	3.75	1.5	8.7
		A2	3.75	1.5	6.8	3.75	1.5	7.0
	A	A3	3.75	1.5	6.1	3.75	1.5	6.3
		A4	3.75	1.5	6.3	4.50	1.5	6.5
		A5	3.75	1.5	7.0	3.75	1.5	7.2
		A6	3.75	1.5	8.9	3.75	1.5	8.9
	Pulv	F1	3.25	1.5	6.5	3.75	1.5	6.8
		F2	3.25	1.5	5.3	3.75	1.5	5.4
	F	F3	3.25	1.5	4.7	3.75	1.5	4.9
		F4	3.75	1.5	4.8	4.50	1.5	5.0
		F5	3.75	1.5	5.4	3.75	1.5	5.6
		F6	3.75	1.5	6.9	3.75	1.5	6.9
	Pulv	B1	3.75	1.5	10.0	3.75	1.5	10.3
		B2	3.75	1.5	8.0	3.75	1.5	8.3
	B	B3	3.75	1.5	7.2	3.75	1.5	7.5
		B4	3.75	1.5	7.4	3.75	1.5	7.6
		B5	3.75	1.5	8.3	3.75	1.5	8.5
		B6	3.75	1.5	10.5	3.75	1.5	10.5
Rear	Pulv	D1	3.75	1.5	**7.1**	3.75	1.5	7.1
		D2	3.75	1.5	**4.7**	3.75	1.5	4.7
	D	D3	3.75	1.5	**4.0**	3.75	1.5	5.0
		D4	3.75	1.5	**4.5**	3.75	1.5	5.0
		D5	3.75	1.5	**6.3**	3.75	1.5	6.3
		D6	5.00	1.5	**10.3**	5.00	1.5	10.3
	Pulv	H1	3.00	1.5	9.1	3.75	1.5	9.3
		H2	3.00	1.5	7.3	3.75	1.5	7.5
	H	H3	3.00	1.5	6.6	3.75	1.5	6.8
		H4	3.00	1.5	6.7	3.75	1.5	6.9
		H5	3.00	1.5	7.5	3.75	1.5	7.7
		H6	3.00	1.5	9.5	3.75	1.5	9.5
	Pulv	C1	3.75	1.5	8.1	3.75	1.5	8.3
		C2	3.75	1.5	6.5	3.75	1.5	6.7
	C	C3	3.75	1.5	5.9	3.75	1.5	6.1
		C4	3.75	1.5	6.0	3.75	1.5	6.2
		C5	3.75	1.5	6.7	5.00	1.5	6.9
		C6	3.75	1.5	8.5	3.75	1.5	8.5
	Pulv	G1	3.75	1.5	12.3	3.75	1.5	12.6
		G2	3.75	1.5	9.9	3.75	1.5	10.2
	G	G3	3.75	1.5	8.9	3.75	1.5	9.2
		G4	3.75	1.5	9.1	3.75	1.5	9.4
		G5	3.75	1.5	10.2	3.75	1.5	10.4
	max	G6	3.75	1.5	12.9	3.75	1.5	12.9

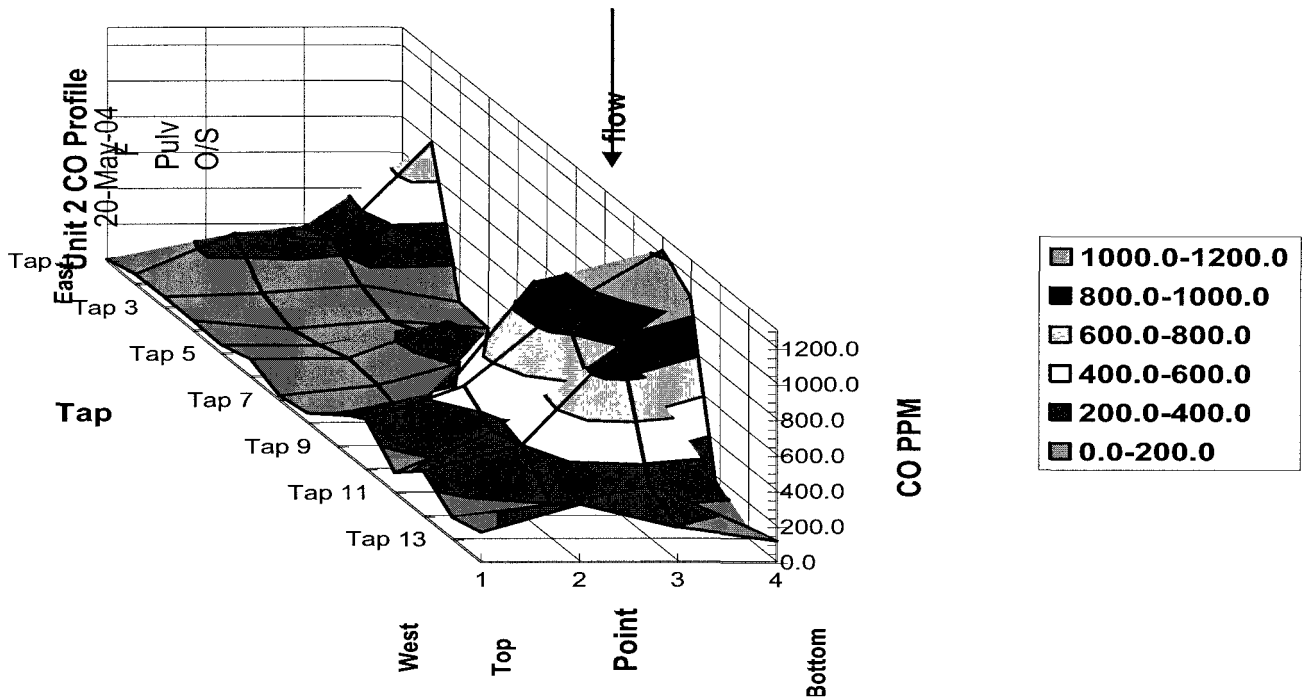


Fig 13 CO Profile 3D

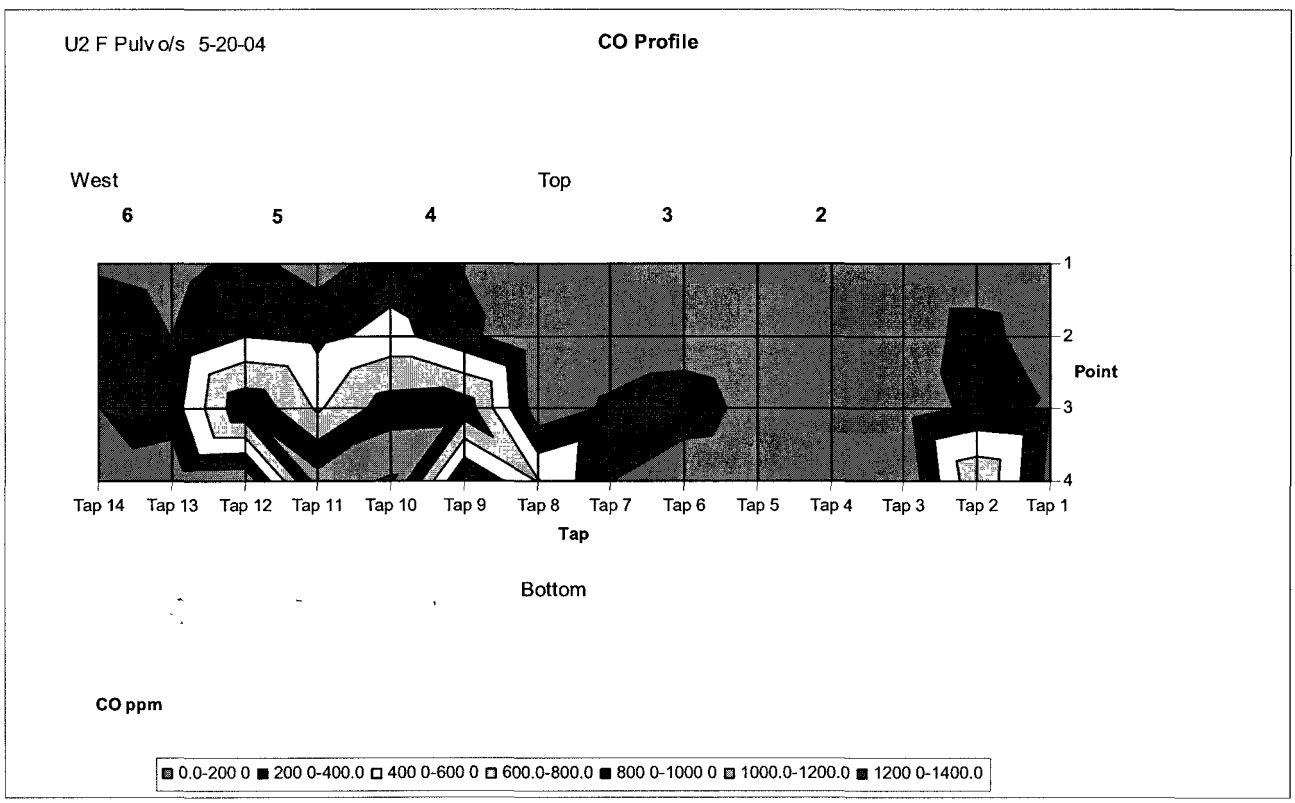


Fig 14 CO Profile 2D

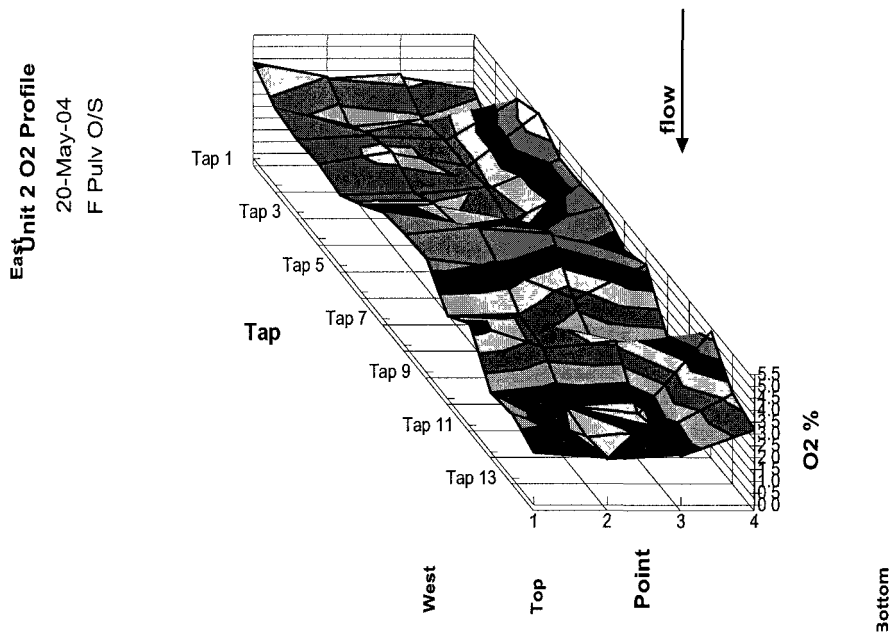


Fig 15 O2 Profile 3D

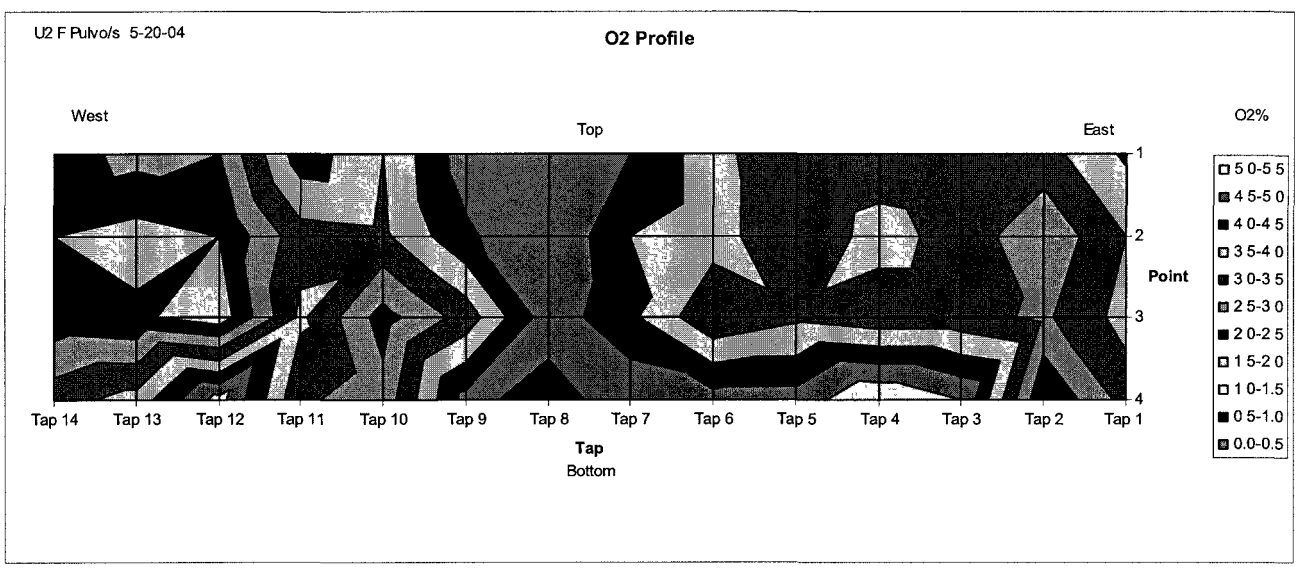


Fig 16 O2 Profile 2D

It seems too much air was taken from side to center so burner settings were changed to supply more air to the center. Open D1 to 8", close D3,D4 to 4.5"

May 21st F mill was back in service.

Table 5 Burner Settings on May 21st 2004

	5/18/04			5/19			All mill I/S 5/21/04		
	Spin Vanes	Inner Air	Outer Register	Spin Vanes	Inner Air	Outer Register	Spin Vanes	Inner Air	Outer Register
E1	3.00	1.5	6.3	3.75	1.5	6.5	3.75	1.5	6.5
E2	3.00	1.5	5.1	3.75	1.5	5.3	3.75	1.5	5.3
E3	3.00	1.5	4.6	3.75	1.5	4.7	4.25	1.5	4.7
E4	3.00	1.5	4.7	4.50	1.5	4.8	4.50	1.5	4.8
E5	3.00	1.5	5.3	3.75	1.5	5.4	3.75	1.5	5.4
E6	3.00	1.5	6.6	3.75	1.5	6.6	3.75	1.5	6.6
A1	3.75	1.5	8.5	3.75	1.5	8.7	3.75	1.5	8.7
A2	3.75	1.5	6.8	3.75	1.5	7.0	3.75	1.5	7.0
A3	3.75	1.5	6.1	3.75	1.5	6.3	4.25	1.5	6.3
A4	3.75	1.5	6.3	4.50	1.5	6.5	4.25	1.5	6.5
A5	3.75	1.5	7.0	3.75	1.5	7.2	3.75	1.5	7.2
A6	3.75	1.5	8.9	3.75	1.5	8.9	3.75	1.5	8.9
F1	3.25	1.5	6.5	3.75	1.5	6.8	3.75	1.5	6.8
F2	3.25	1.5	5.3	3.75	1.5	5.4	3.75	1.5	5.4
F3	3.25	1.5	4.7	3.75	1.5	4.9	4.25	1.5	4.9
F4	3.75	1.5	4.8	4.50	1.5	5.0	4.25	1.5	5.0
F5	3.75	1.5	5.4	3.75	1.5	5.6	3.75	1.5	5.6
F6	3.75	1.5	6.9	3.75	1.5	6.9	3.75	1.5	6.9
B1	3.75	1.5	10.0	3.75	1.5	10.3	3.75	1.5	10.3
B2	3.75	1.5	8.0	3.75	1.5	8.3	3.75	1.5	8.3
B3	3.75	1.5	7.2	3.75	1.5	7.5	3.75	1.5	7.5
B4	3.75	1.5	7.4	3.75	1.5	7.6	3.75	1.5	7.6
B5	3.75	1.5	8.3	3.75	1.5	8.5	3.75	1.5	8.5
B6	3.75	1.5	10.5	3.75	1.5	10.5	3.75	1.5	10.5

	5/18/04			5/19/04			All mill I/S 5/21/04		
	Spin Vanes	Inner Air	Outer Register	Spin Vanes	Inner Air	Outer Register	Spin Vanes	Inner Air	Outer Register
D1	3.75	1.5	**7.1**	3.75	1.5	7.1	3.75	1.5	8.0
D2	3.75	1.5	**4.7**	3.75	1.5	4.7	3.75	1.5	4.7
D3	3.75	1.5	**4.0**	3.75	1.5	5.0	3.75	1.5	4.5
D4	3.75	1.5	**4.5**	3.75	1.5	5.0	3.75	1.5	4.5
D5	3.75	1.5	**6.3**	3.75	1.5	6.3	3.75	1.5	7.0
D6	5.00	1.5	**10.3**	5.00	1.5	10.3	5.00	1.5	10.3
H1	3.00	1.5	9.1	3.75	1.5	9.3	3.75	1.5	9.3
H2	3.00	1.5	7.3	3.75	1.5	7.5	3.75	1.5	7.5
H3	3.00	1.5	6.6	3.75	1.5	6.8	3.75	1.5	6.8
H4	3.00	1.5	6.7	3.75	1.5	6.9	3.75	1.5	6.9
H5	3.00	1.5	7.5	3.75	1.5	7.7	3.75	1.5	7.7
H6	3.00	1.5	9.5	3.75	1.5	9.5	3.75	1.5	9.5
C1	3.75	1.5	8.1	3.75	1.5	8.3	3.75	1.5	8.3
C2	3.75	1.5	6.5	3.75	1.5	6.7	3.75	1.5	6.7
C3	3.75	1.5	5.9	3.75	1.5	6.1	3.75	1.5	6.1
C4	3.75	1.5	6.0	3.75	1.5	6.2	3.75	1.5	6.2
C5	3.75	1.5	6.7	5.00	1.5	6.9	5.00	1.5	6.9
C6	3.75	1.5	8.5	3.75	1.5	8.5	3.75	1.5	8.5

G1	3.75	1.5	12.3	3.75	1.5	12.6	3.75	1.5	12.6
G2	3.75	1.5	9.9	3.75	1.5	10.2	3.75	1.5	10.2
G3	3.75	1.5	8.9	3.75	1.5	9.2	3.75	1.5	9.2
G4	3.75	1.5	9.1	3.75	1.5	9.4	3.75	1.5	9.4
G5	3.75	1.5	10.2	3.75	1.5	10.4	3.75	1.5	10.4
G6	3.75	1.5	12.9	3.75	1.5	12.9	3.75	1.5	12.9

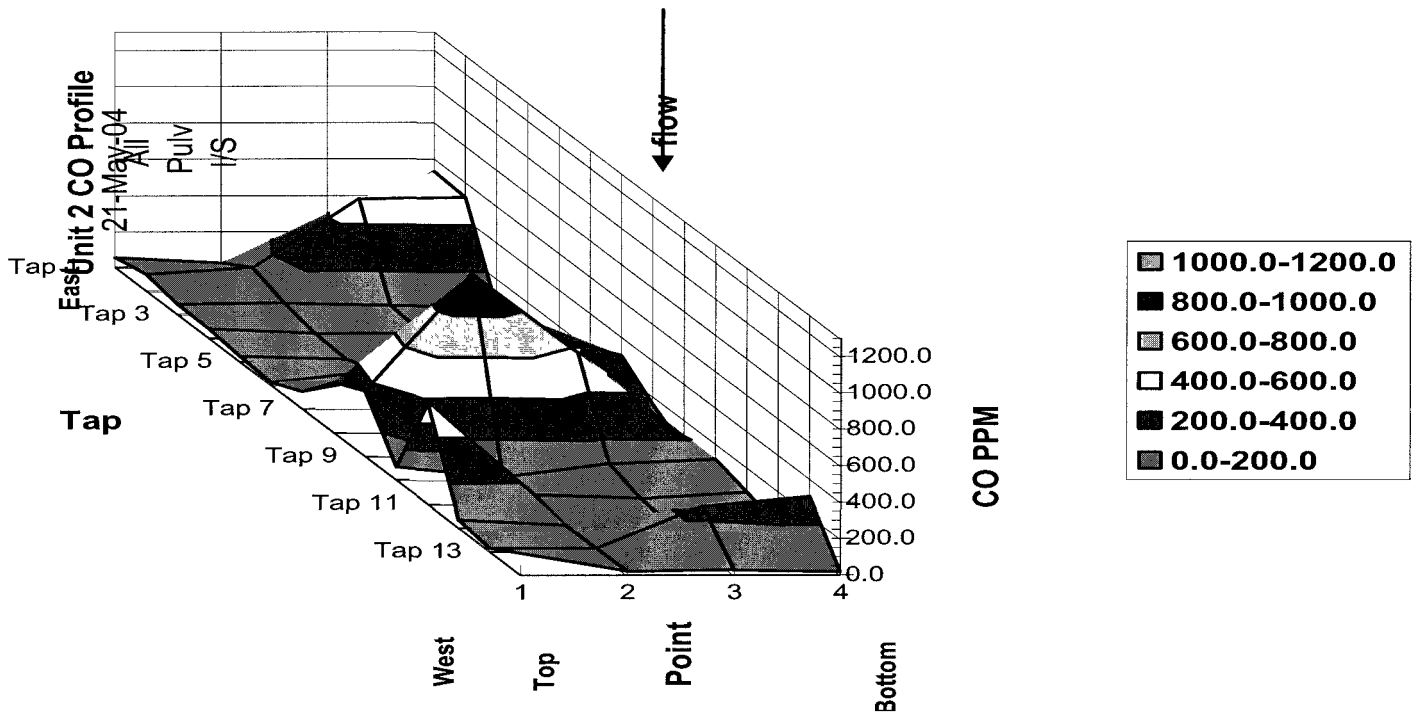


Fig 17 CO Profile 3D

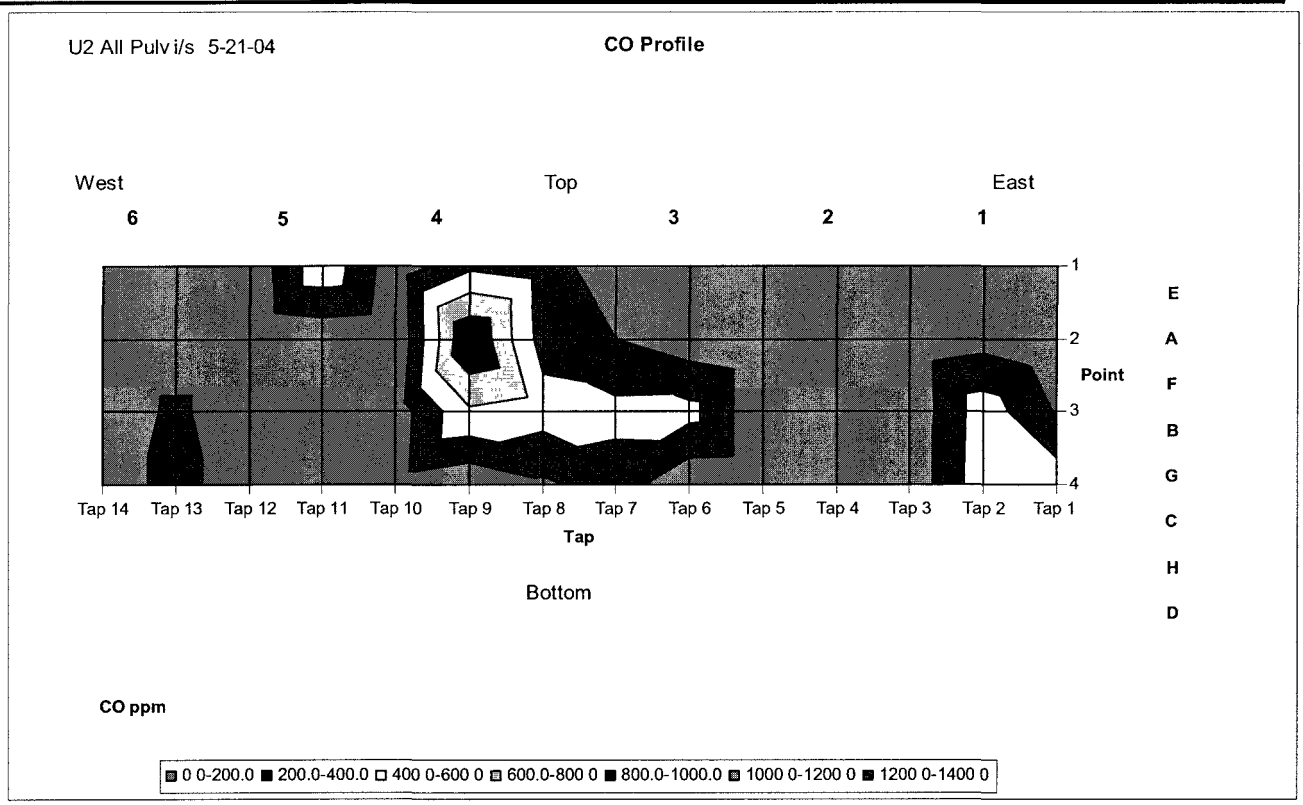


Fig 18 CO Profile 3D

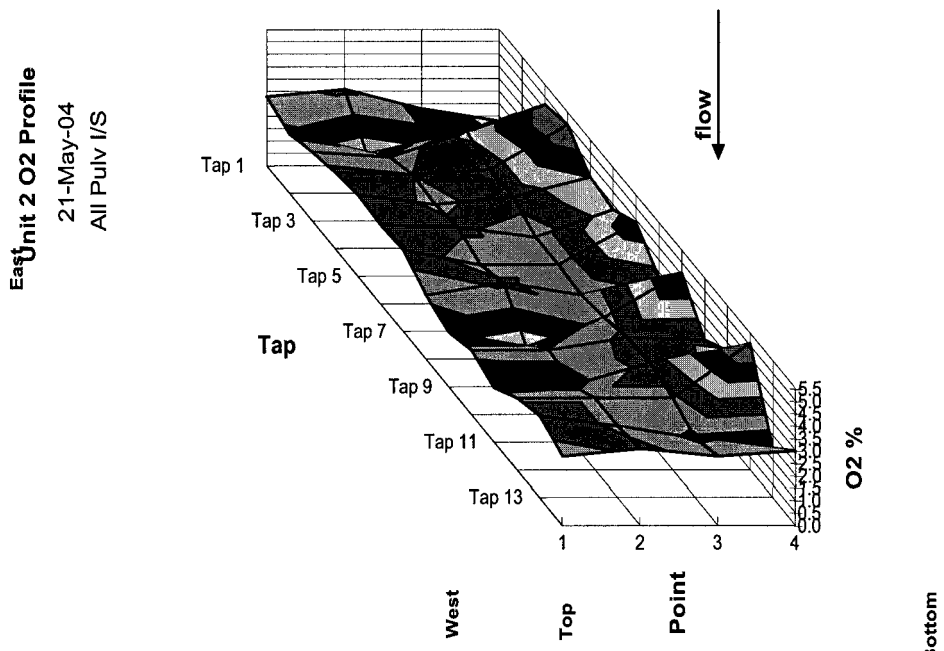


Fig 19 O2 Profile 3D

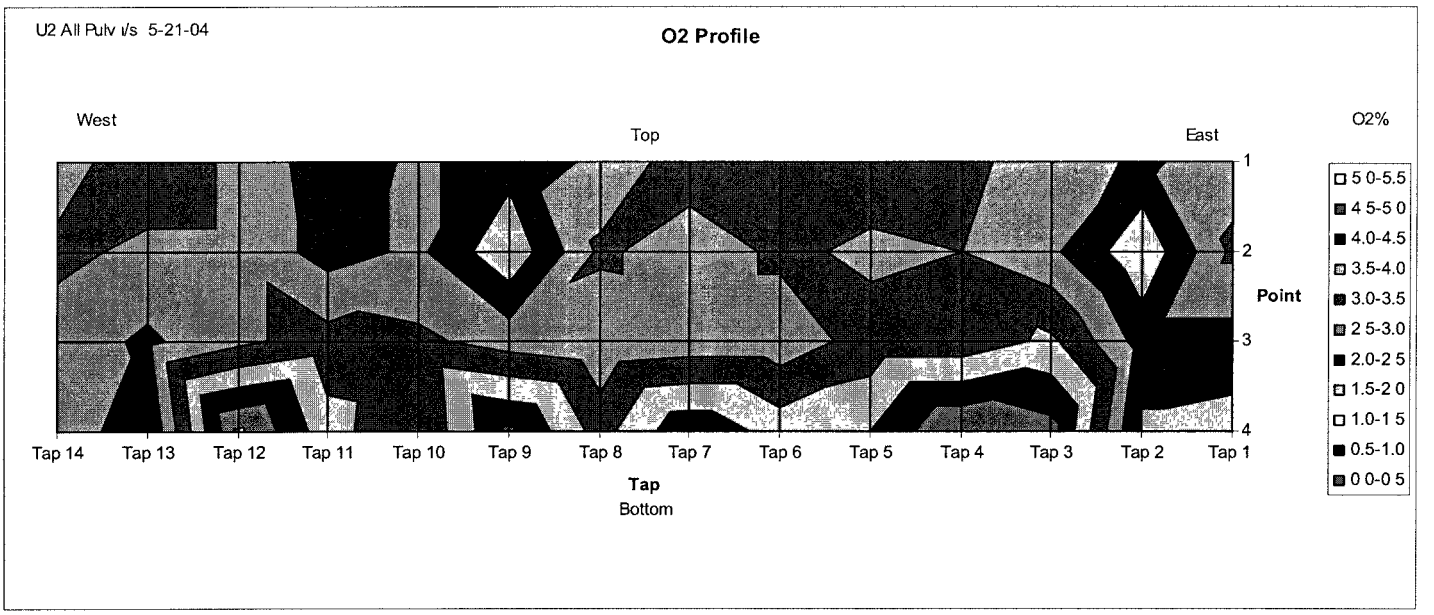


Fig 20 O2 Profile 2D

Table 6: Overall CO and O2 for Recent Test

Testing time	Ave. Grid O2	Ave. Grid CO
April 27 All I/S	3.34	33.395
April 27 All I/S	3.67	17.105
April28 C O/S	3.78	380.49
April28 D O/S	3.695	200.315
April29 E O/S	3.19	662.525
April29 A O/S	3.055	537.015
April30 H O/S	3.52	172.555
April30 H O/S	3.805	69.145
May 3 G O/S	2.985	830.835
May 3 G O/S	3.21	649.025
May 3 G O/S	3.335	595.9
May 4 B O/S	2.99	743.325
May 4 D O/S	3.15	691.06
May 4 D O/S	3.925	395.94
May 7 F O/S	3.48	614.3
May18All I/S	3.23	206
May19All I/S	3.3	104
May20 F/O	3.5	250
May21 All I/S	2.98	164

After this profile C mill was O/S and ABT engineers surveyed the burner flames close to west sidewall. G6's flame was in bad shape, no definition and flame is too short, ABT engineers closed D5 and D1, opened up H3 and H4 spin vanes from 3.75" to 4", Closed G1

and G6's inner air register from 1.5" to 1", open the spin vane to 4" to let more air go through. Open B1 and B6 outer register from 10.5 to11.5, open B6 inner air to 2", open B1,B4, B6 spin vane to 4. Close B1 inner air to 1", open A4, F4 spin vane to 4.5".

Table 7 Burner Settings on May 21 2004

5/21/04 All Mill I/S	Spin Vanes	Inner Air	Outer Register	5/21/04 Spin	r11 Inner	c o/s Outer Register
E1	3.75	1.5	6.5	Vanes	Air	
E2	3.75	1.5	5.3	3.75	1.5	**6.51**
E3	4.25	1.5	4.7	3.75	1.5	**5.26**
E4	4.50	1.5	4.8	4.25	1.5	**4.73**
E5	3.75	1.5	5.4	4.50	1.5	**4.83**
E6	3.75	1.5	6.6	3.75	1.5	**5.36**
A1	3.75	1.5	8.7	3.75	1.5	**6.65**
A2	3.75	1.5	7.0	3.75	1.5	**8.74**
A3	4.25	1.5	6.3	3.75	1.5	**7.05**
A4	4.25	1.5	6.5	4.25	1.5	**6.34**
A5	3.75	1.5	7.2	4.50	1.5	**6.48**
A6	3.75	1.5	8.9	3.75	1.5	**7.20**
F1	3.75	1.5	6.8	3.75	1.5	**8.92**
F2	3.75	1.5	5.4	3.75	1.5	**6.75**
F3	4.25	1.5	4.9	3.75	1.5	**5.45**
F4	4.25	1.5	5.0	4.25	1.5	**4.90**
F5	3.75	1.5	5.6	4.50	1.5	**5.01**
F6	3.75	1.5	6.9	3.75	1.5	**5.56**
B1	3.75	1.5	10.3	3.75	1.5	**6.89**
B2	3.75	1.5	8.3	4.00	1.0	**11.50**
B3	3.75	1.5	7.5	3.75	1.5	**8.29**
B4	3.75	1.5	7.6	3.75	1.5	**7.46**
B5	3.75	1.5	8.5	4.00	1.5	**7.62**
B6	3.75	1.5	10.5	3.75	1.5	**8.47**
D1	3.75	1.5	8.0	3.75	1.5	7.50
D2	3.75	1.5	4.7	3.75	1.5	4.70
D3	3.75	1.5	4.5	3.75	1.5	4.50
D4	3.75	1.5	4.5	3.75	1.5	4.50
D5	3.75	1.5	7.0	3.75	1.5	6.50
D6	5.00	1.5	10.3	5	1.5	10.30
H1	3.75	1.5	9.3	3.75	1.5	9.35
H2	3.75	1.5	7.5	3.75	1.5	7.54
H3	3.75	1.5	6.8	4	1.5	6.78
H4	3.75	1.5	6.9	4	1.5	6.93
H5	3.75	1.5	7.7	3.75	1.5	7.70
H6	3.75	1.5	9.5	3.75	1.5	9.54
C1	3.75	1.5	8.3	3.75	1.5	8.34
C2	3.75	1.5	6.7	3.75	1.5	6.73
C3	3.75	1.5	6.1	3.75	1.5	6.05
C4	3.75	1.5	6.2	3.75	1.5	6.18
C5	5.00	1.5	6.9	5	1.5	6.87
C6	3.75	1.5	8.5	3.75	1.5	8.51
G1	3.75	1.5	12.6	4	1	13.00
G2	3.75	1.5	10.2	3.75	1.5	10.20

G3	3.75	1.5	9.2	3.75	1.5	9.18
G4	3.75	1.5	9.4	3.75	1.5	9.37
G5	3.75	1.5	10.4	3.75	1.5	10.41
G6	3.75	1.5	12.9	4.0	1.0	13.00

May 21st
C mill O/S

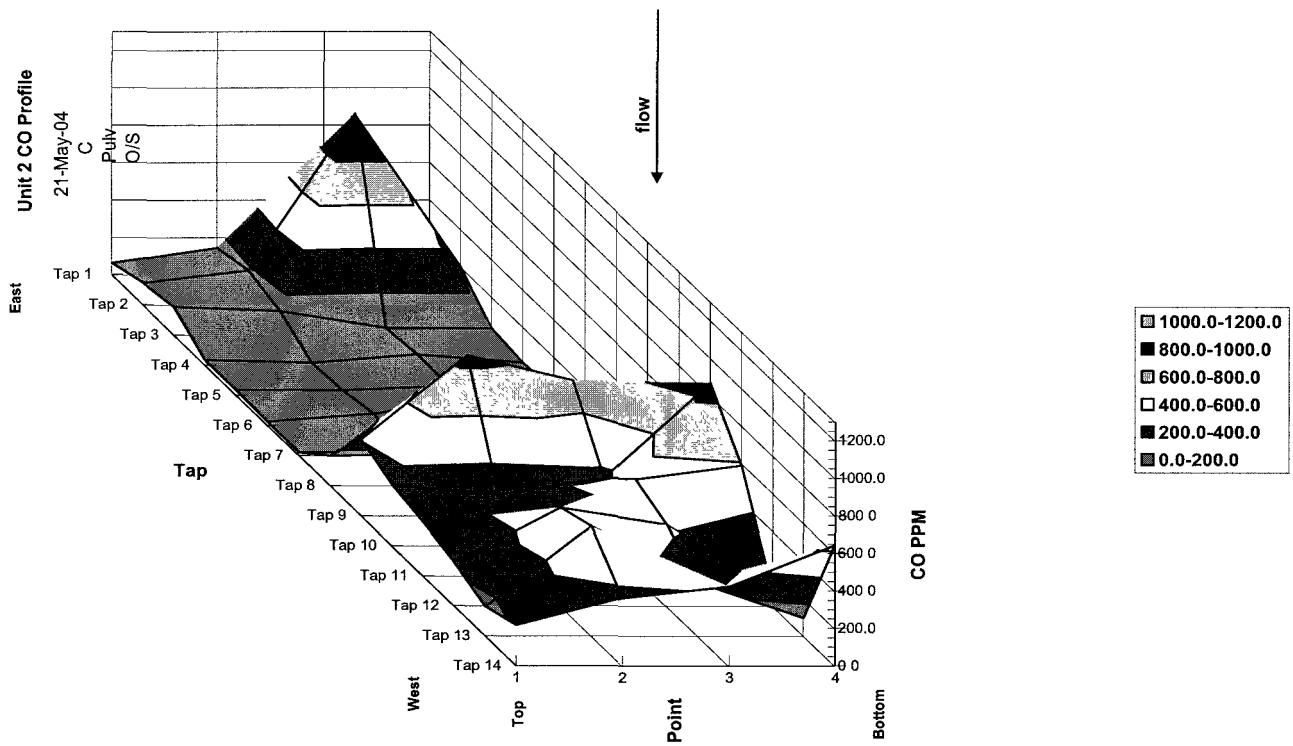


Fig 21 CO Profile 3D

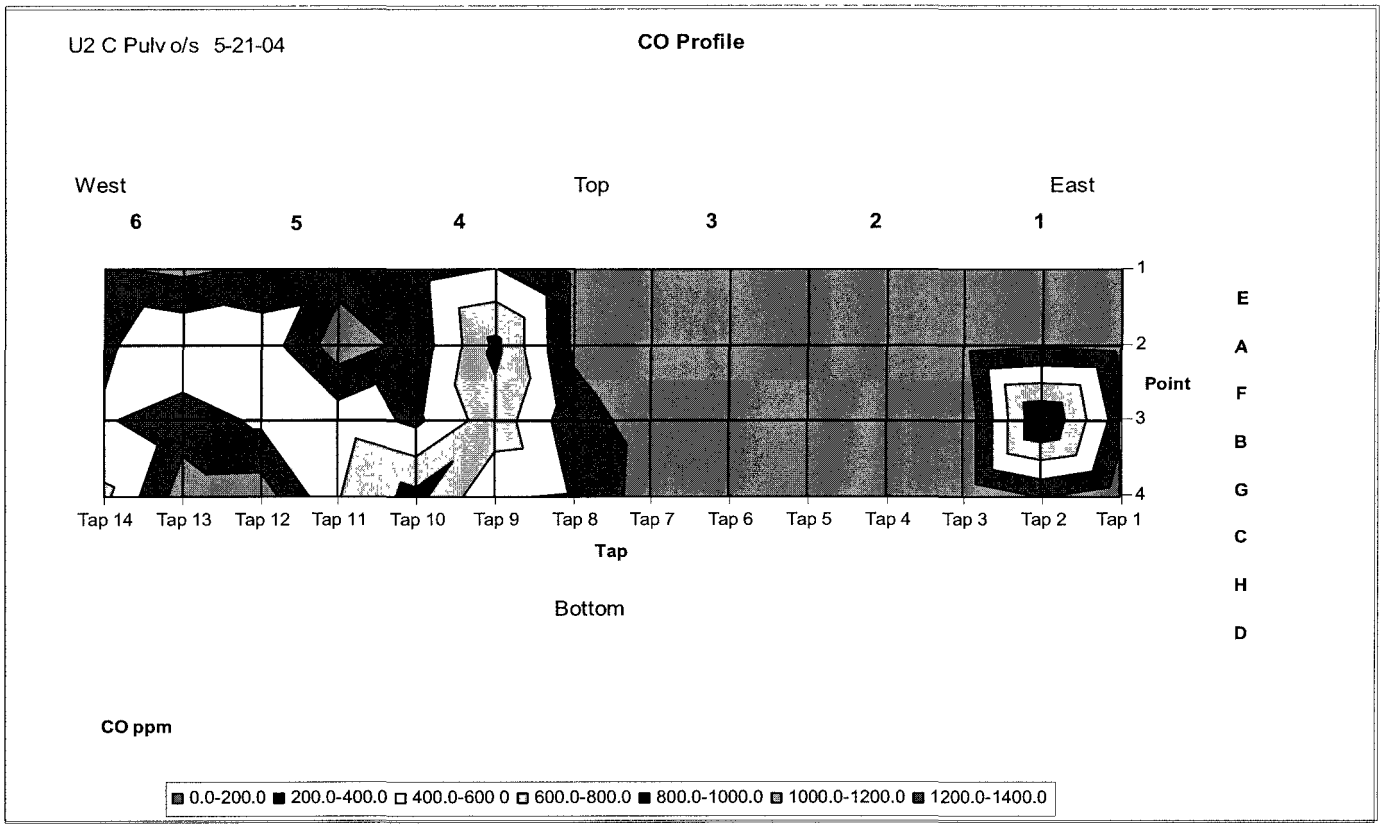


Fig 22 CO Profile 2D

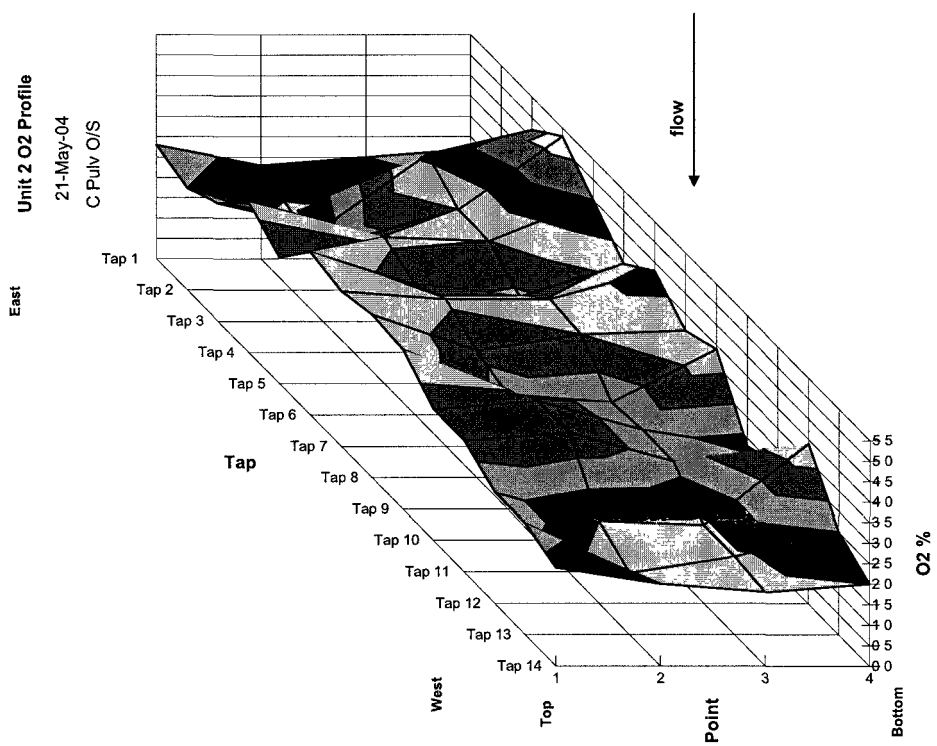


Fig 23 O2 Profile 3D

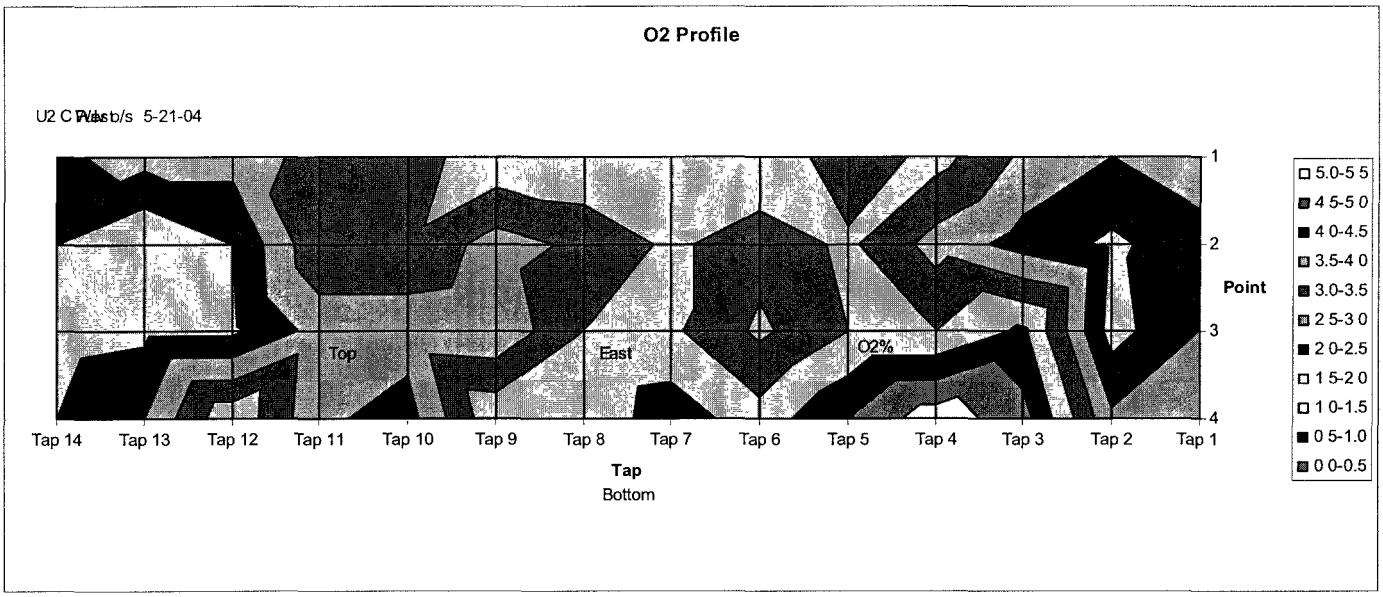


Fig 24 O2 Profile 2D

May 22nd C mill O/S in the morning.

B1 was starved for air and looked smokey. ABT closed its inner zone damper to 0.5", opened spin van to 4", and open outer register to 14". Flame brightened, smoke was gone.

Table 8: Co on May 22nd 2004

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	960.0	1006.0	181.0	126.0	87.0	109.0	153.0	265.0	421.0	211.0	209.0	90.0	85.0	46.0
2	829.0	1218.0	291.0	186.0	150.0	223.0	339.0	256.0	956.0	158.0	122.0	96.0	83.0	26.0
3	202.0	580.0	50.0	107.0	109.0	1055.0	1176.0	1228.0	1022.0	119.0	653.0	321.0	174.0	172.0
4	2.8	170.0	68.0	158.0	268.0	1218.0	1218.0	522.0	859.0	1228.0	1228.0	548.0	137.0	144.0

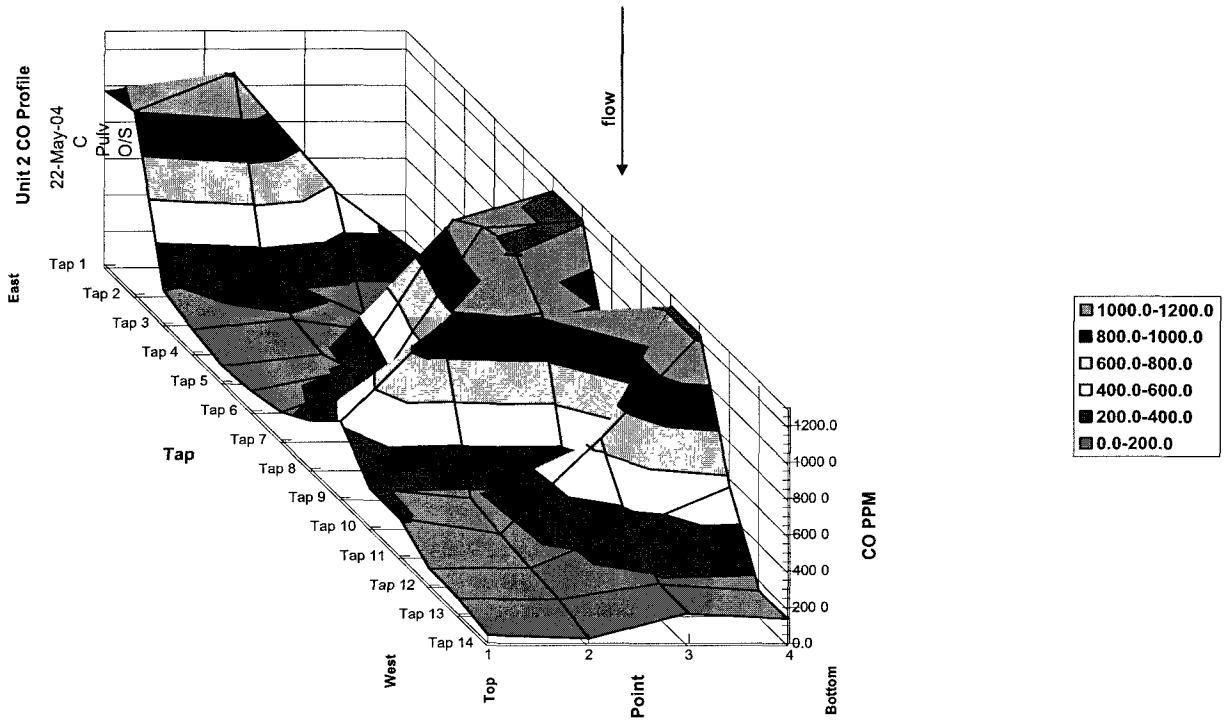


Fig 25 CO Profile 3D

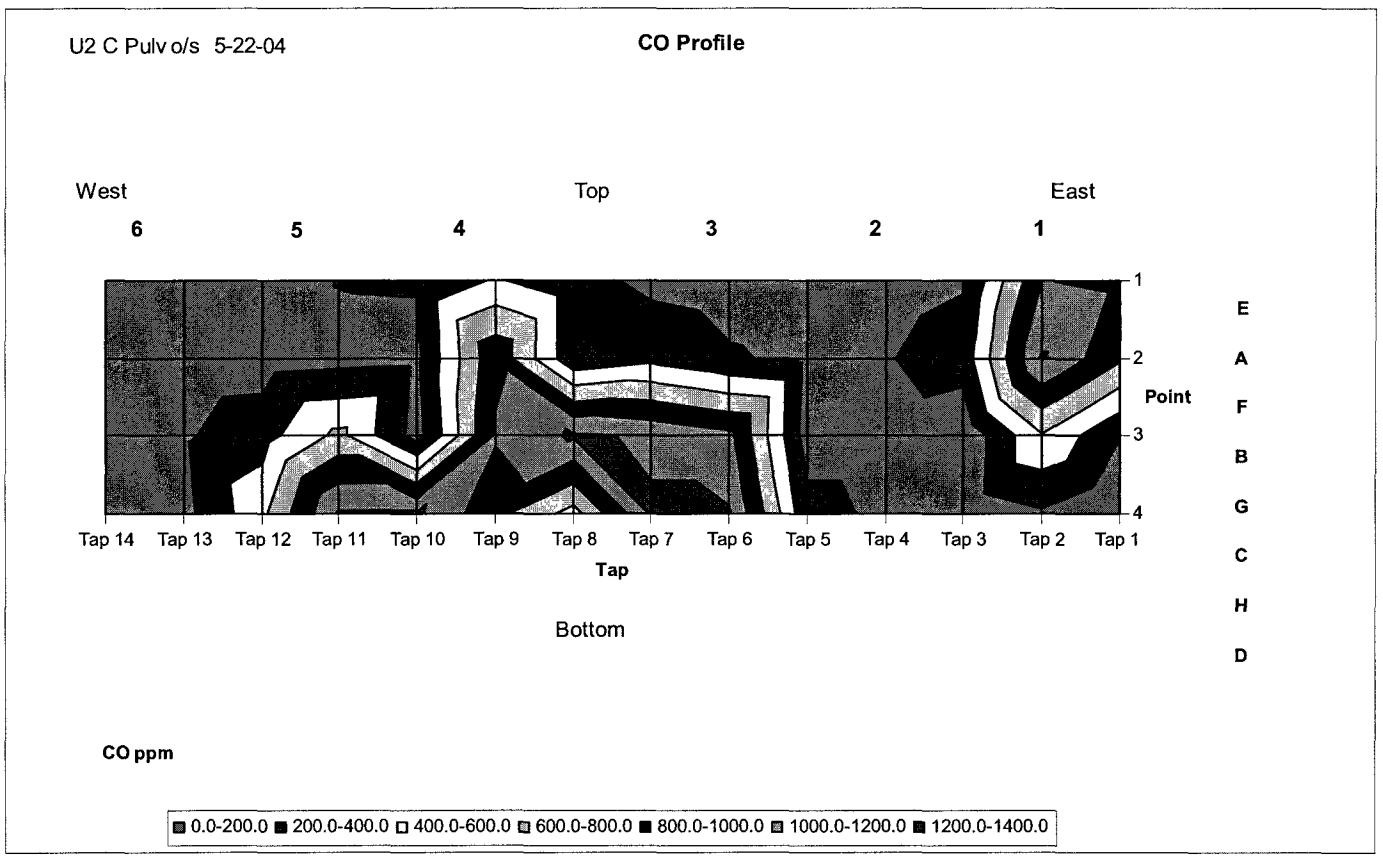


Fig 26 CO Profile 3D

Table 9: O2 Readings on May 22, 2004

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.5	1.5	2.7	3.1	3.0	3.3	3.6	3.8	4.0	3.8	3.6	2.9	2.9	3.1
2	1.6	0.8	2.3	2.8	3.0	3.3	3.4	3.7	3.1	3.6	3.7	2.7	2.4	2.9
3	2.3	3.3	4.8	4.7	3.3	2.4	2.6	3.1	2.8	3.9	3.2	2.9	2.5	2.7
4	2.8	3.3	5.6	4.9	3.6	2.3	2.2	4.5	3.1	2.2	2.7	3.5	3.0	2.4

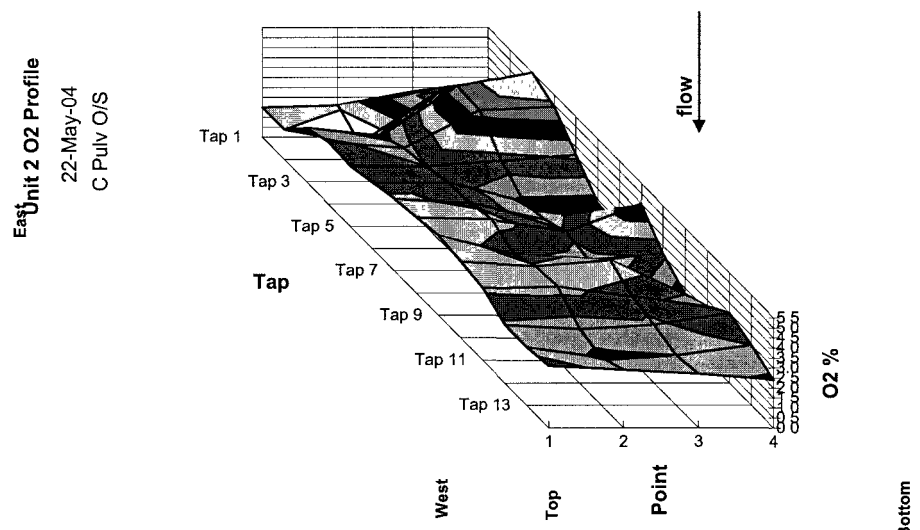


Fig 27 O2 Profile 3D

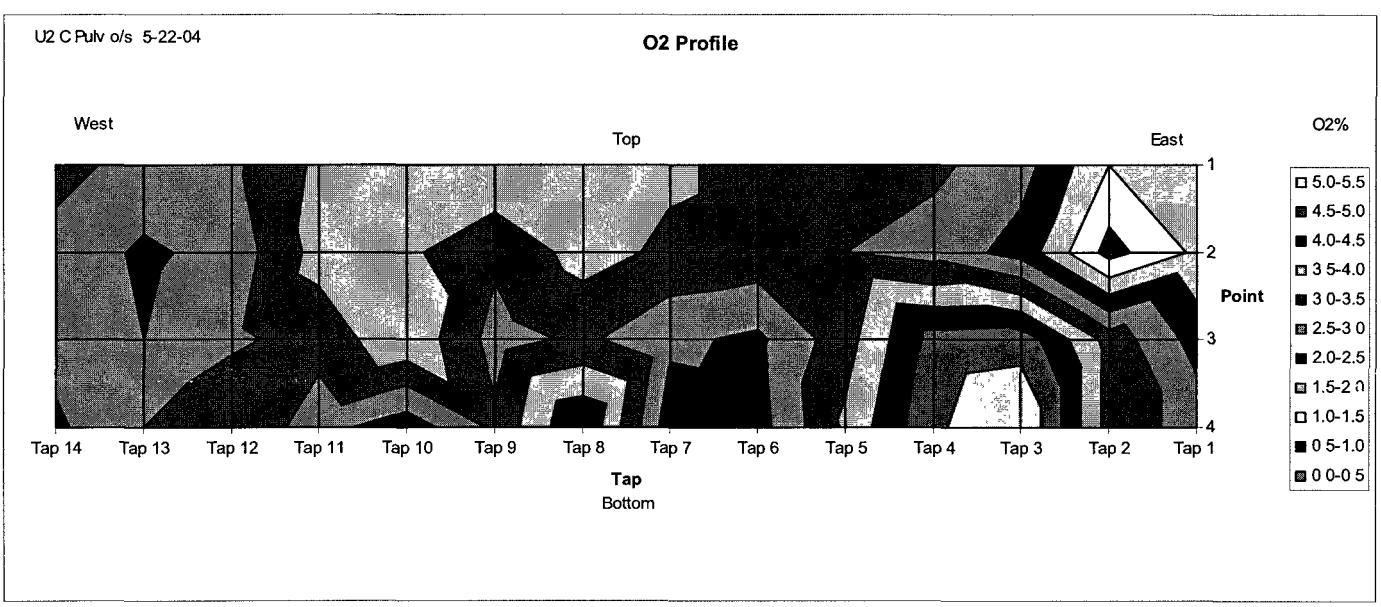


Fig 28 O2 Profile 3D

May 22nd afternoon A mill O/S Same burner Settings

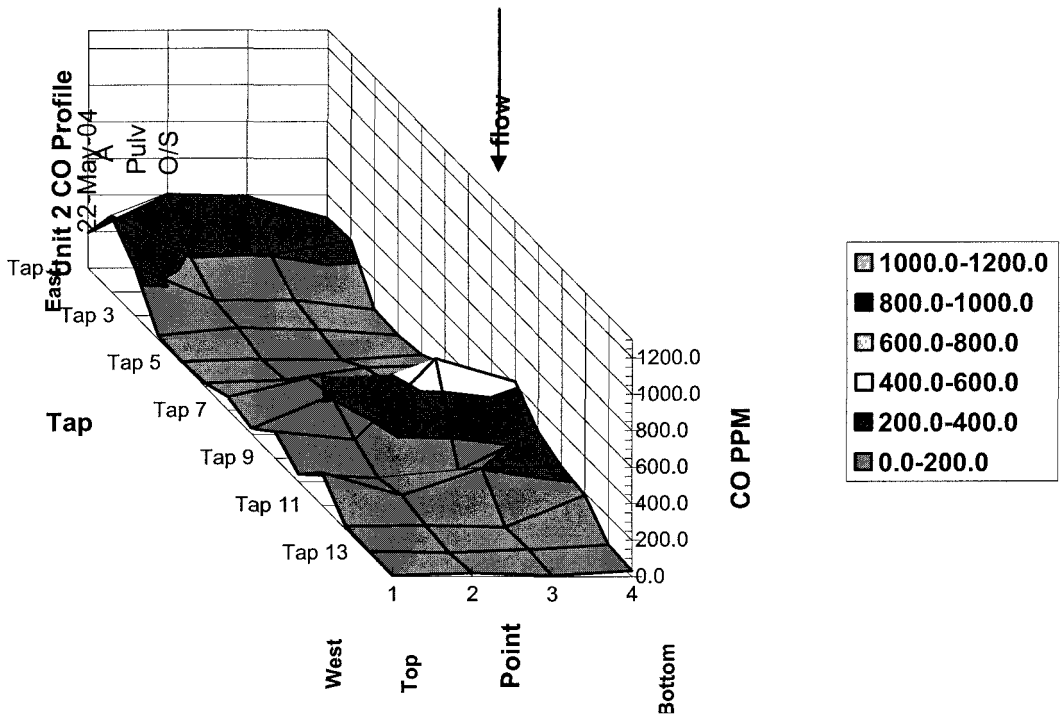


Fig 29 CO Profile 3D

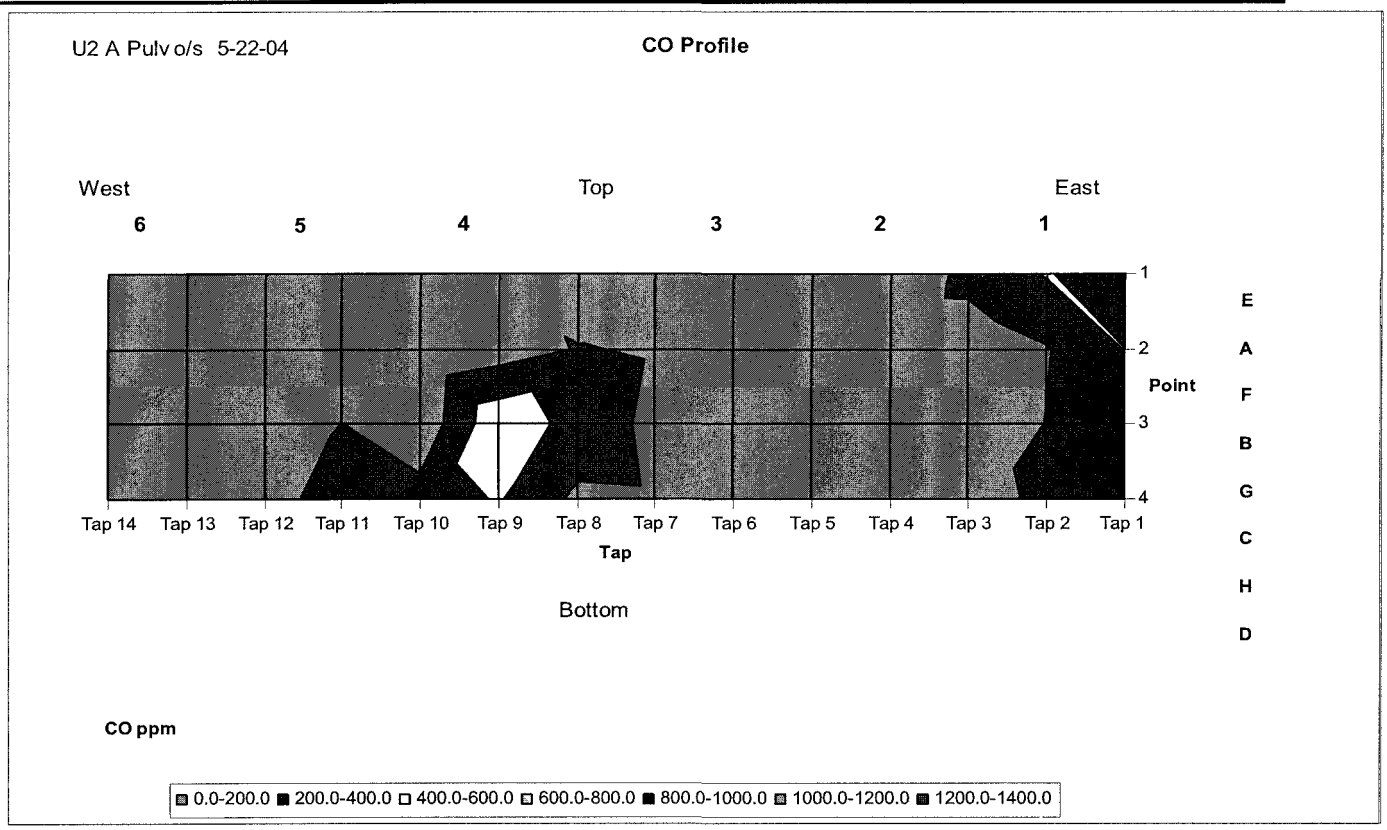


Fig 30 CO Profile 2D

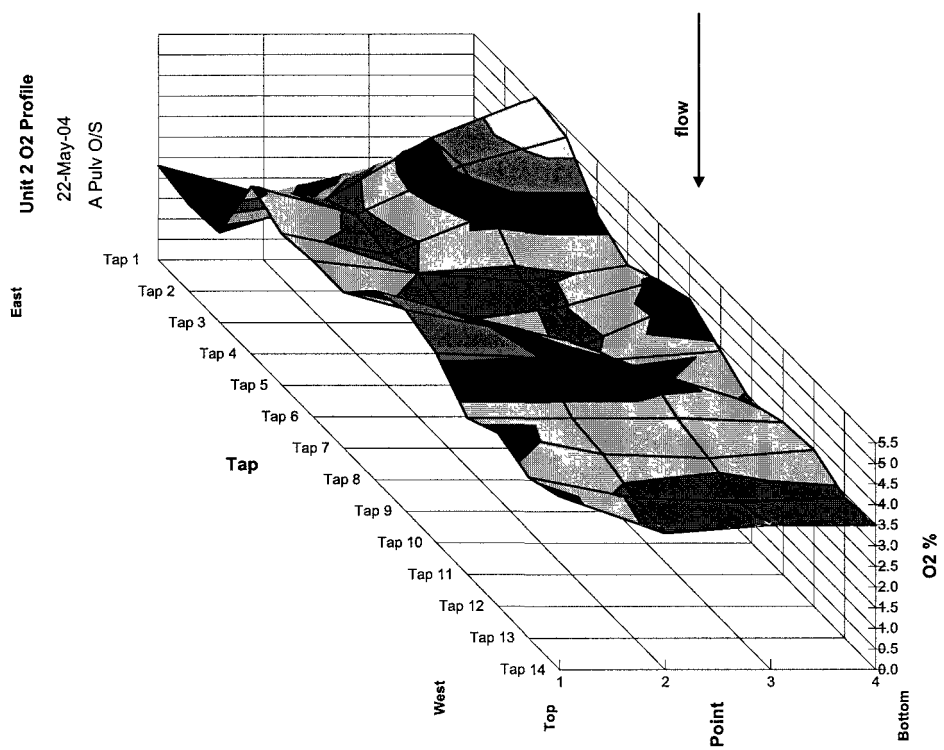


Fig 31 O2 Profile 3D

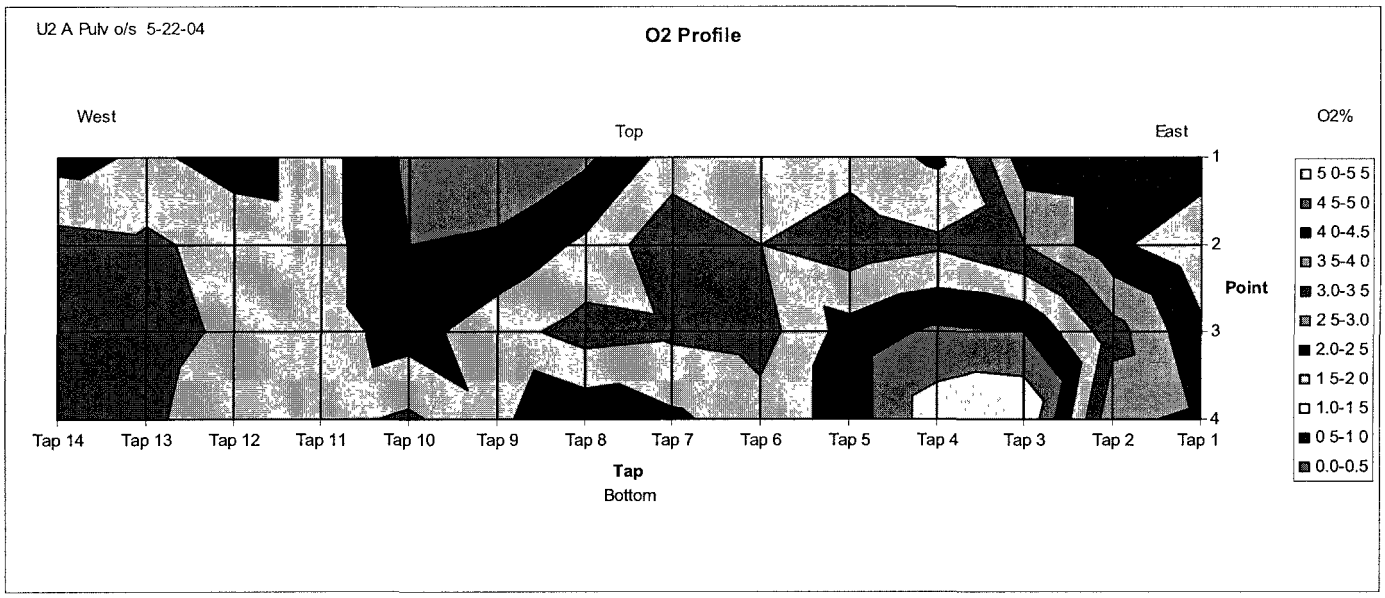


Fig 32 CO Profile 2D

Table 10: Overall Testing results

Testing time	Ave. Grid O2	Ave. Grid CO
May18All I/S	3.23	206
May19All I/S	3.3	104
May20 F/O	3.5	250
May21 All I/S	2.98	164
May21 C O/S	3.04	249
May22 C O/S	3.08	422
May22 A O/S	3.64	130

May 23rd H mill O/S

As found condition

Table 11: CO grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	29.0	35.0	27.0	71.0	100.0	172.0	333.0	96.0	38.0	46.0	21.0	19.0	32.0	43.0
2	35.0	8.0	72.0	7.0	15.0	140.0	360.0	69.0	84.0	8.0	6.0	7.0	7.0	19.0
3	67.0	32.0	31.0	95.0	130.0	1218.0	1218.0	1228.0	1227.0	205.0	361.0	5.0	27.0	95.0
4	180.0	145.0	1070.0	1218.0	1218.0	1218.0	1218.0	1228.0	1227.0	475.0	285.0	206.0	112.0	94.0

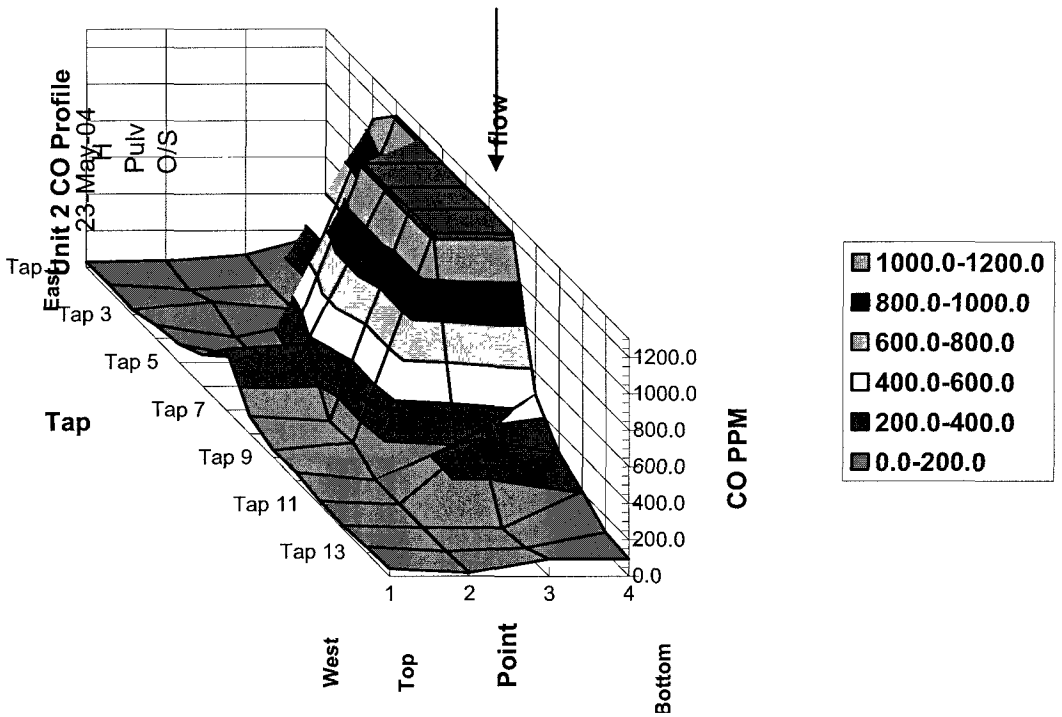


Fig 33 CO Profile 3D

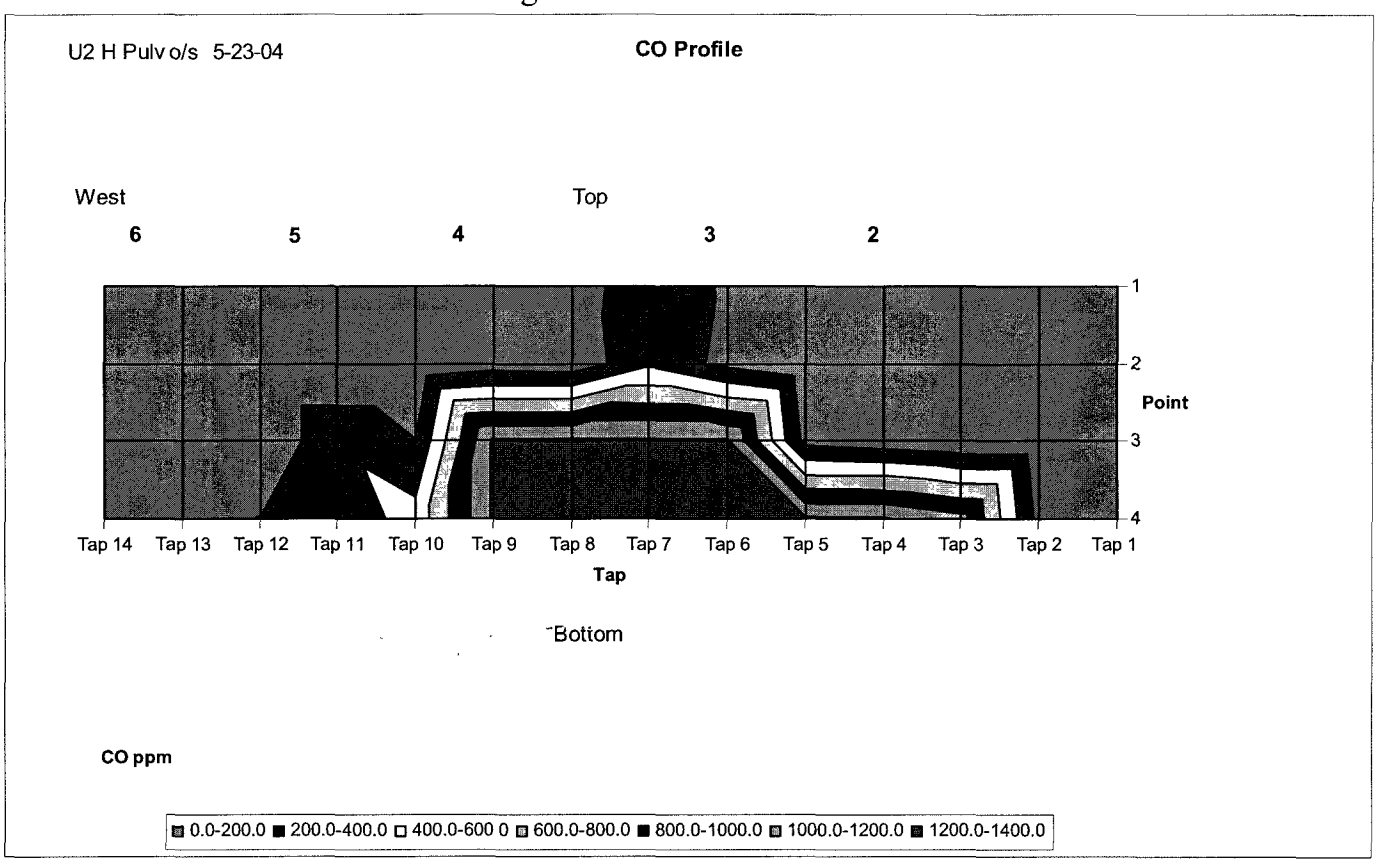


Fig 34 CO Profile 3D

Table 12: O2 grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	3.5	3.3	3.2	3.5	3.5	3.4	3.7	3.9	4.7	4.4	4.2	3.6	3.8	3.5
2	3.1	2.6	3.3	3.7	3.2	2.9	2.8	4.4	4.2	4.5	4.3	4.4	3.3	3.6
3	3.5	3.0	4.4	3.6	3.8	1.8	2.0	2.0	2.7	4.1	4.8	3.6	3.6	3.6
4	3.7	3.5	3.9	2.8	2.5	1.0	0.7	1.3	2.1	2.8	3.5	5.4	4.6	4.5

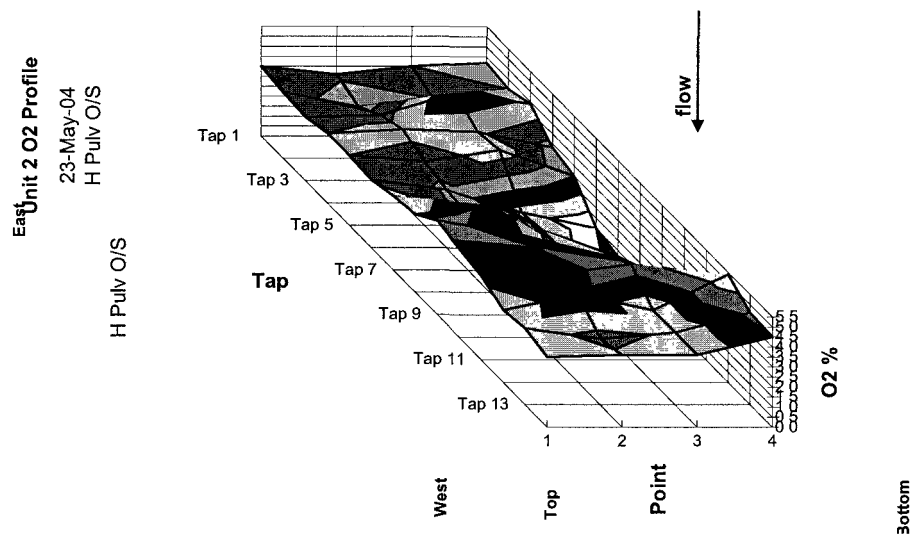


Fig 35 O2 Profile 3D

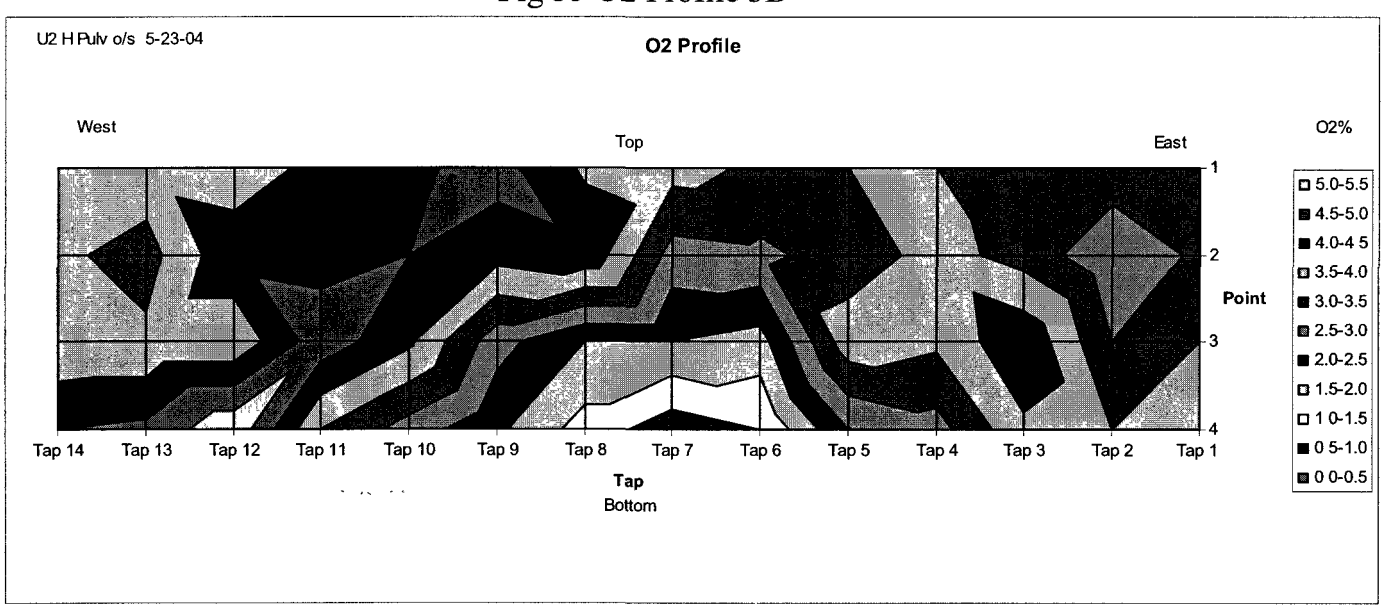


Fig 36 CO Profile 2D

CO was forced to the center by opening the side burners.

Table 13: Burner settings

5/21/04	r11 Spin	c o/s Inner	Outer		5/23/04 Spin	r12 Inner	H O/S Run2 Outer
E1	3.75	1.5	**6.5**	E1	3.75	1.5	6.5
E2	3.75	1.5	**5.3**	E2	3.75	1.5	5.1
E3	4.25	1.5	**4.7**	E3	4.25	1.5	4.6
E4	4.50	1.5	**4.8**	E4	4.5	1.5	4.7
E5	3.75	1.5	**5.4**	E5	3.75	1.5	5.4
E6	3.75	1.5	**6.6**	E6	4	0.5	12.0
A1	3.75	1.5	**8.7**	A1	3.75	1.5	8.6
A2	3.75	1.5	**7.0**	A2	3.75	1.5	6.8
A3	4.25	1.5	**6.3**	A3	4.25	1.5	6.1
A4	4.50	1.5	**6.5**	A4	4.25	1.5	6.3
A5	3.75	1.5	**7.2**	A5	3.75	1.5	7.1
A6	3.75	1.5	**8.9**	A6	4	0.5	10.0
F1	3.75	1.5	**6.8**	F1	4	0.5	10.0
F2	3.75	1.5	**5.4**	F2	3.75	1.5	5.4
F3	4.25	1.5	**4.9**	F3	4.25	1.5	4.8
F4	4.50	1.5	**5.0**	F4	4.25	1.5	5.2
F5	3.75	1.5	**5.6**	F5	3.75	1.5	5.6
F6	3.75	1.5	**6.9**	F6	4	0.5	10.0
B1	4.00	1.0	**11.5**	B1	5	0.5	14.0
B2	3.75	1.5	**8.3**	B2	3.75	1.5	8.0
B3	3.75	1.5	**7.5**	B3	3.75	1.5	7.1
B4	4.00	1.5	**7.6**	B4	3.75	1.5	7.6
B5	3.75	1.5	**8.5**	B5	3.75	1.5	8.4
B6	4.00	2.0	**11.5**	B6	4	0.5	14.0
D1	3.75	1.5	7.5	D1	3.75	1.5	8.0
D2	3.75	1.5	4.7	D2	3.5	1.5	4.7
D3	3.75	1.5	4.5	D3	3.5	1.5	4.5
D4	3.75	1.5	4.5	D4	3.75	1.5	4.8
D5	3.75	1.5	6.5	D5	3.75	1.5	7.0
D6	5	1.5	10.3	**D6**	5	1.5	10.3
H1	3.75	1.5	9.3	H1	3.75	1.5	9.7
H2	3.75	1.5	7.5	H2	3.75	1.5	7.4
H3	4	1.5	6.8	H3	3.75	1.5	6.6
H4	4	1.5	6.9	H4	3.75	1.5	6.8
H5	3.75	1.5	7.7	H5	3.75	1.5	7.7
H6	3.75	1.5	9.5	H6	3.75	1.5	9.5
C1	3.75	1.5	8.3	C1	3.75	1.5	9.0
C2	3.75	1.5	6.7	C2	3.75	1.5	6.7
C3	3.75	1.5	6.1	C3	3.75	1.5	6.0
C4	3.75	1.5	6.2	C4	3.75	1.5	6.2
C5	5	1.5	6.9	C5	5	1.5	7.0
C6	3.75	1.5	8.5	C6	5	0.5	11.0
G1	4	1	13.0	G1	4	1	12.6
G2	3.75	1.5	10.2	G2	3.75	1.5	10.0
G3	3.75	1.5	9.2	G3	3.75	1.5	8.9
G4	3.75	1.5	9.4	G4	3.75	1.5	9.2
G5	3.75	1.5	10.4	G5	4	0.5	11.0
G6	4.0	1.0	13.0	G6	4	0.5	14.0

Table 14: CO grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	58.0	50.0	99.0	394.0	332.0	1217.0	124.0	221.0	148.0	124.0	117.0	15.0	61.0	14.0
2	29.0	180.0	4.7	36.0	218.0	1217.0	1092.0	200.0	705.0	23.0	16.0	6.0	14.0	11.0
3	84.0	41.0	20.0	73.0	534.0	1217.0	1210.0	1153.0	1228.0	451.0	27.0	4.0	13.0	56.0
4	142.0	123.0	66.0	46.0	326.0	456 0	1217.0	1228.0	1068.0	368.0	38.0	21.0	40.0	120.0

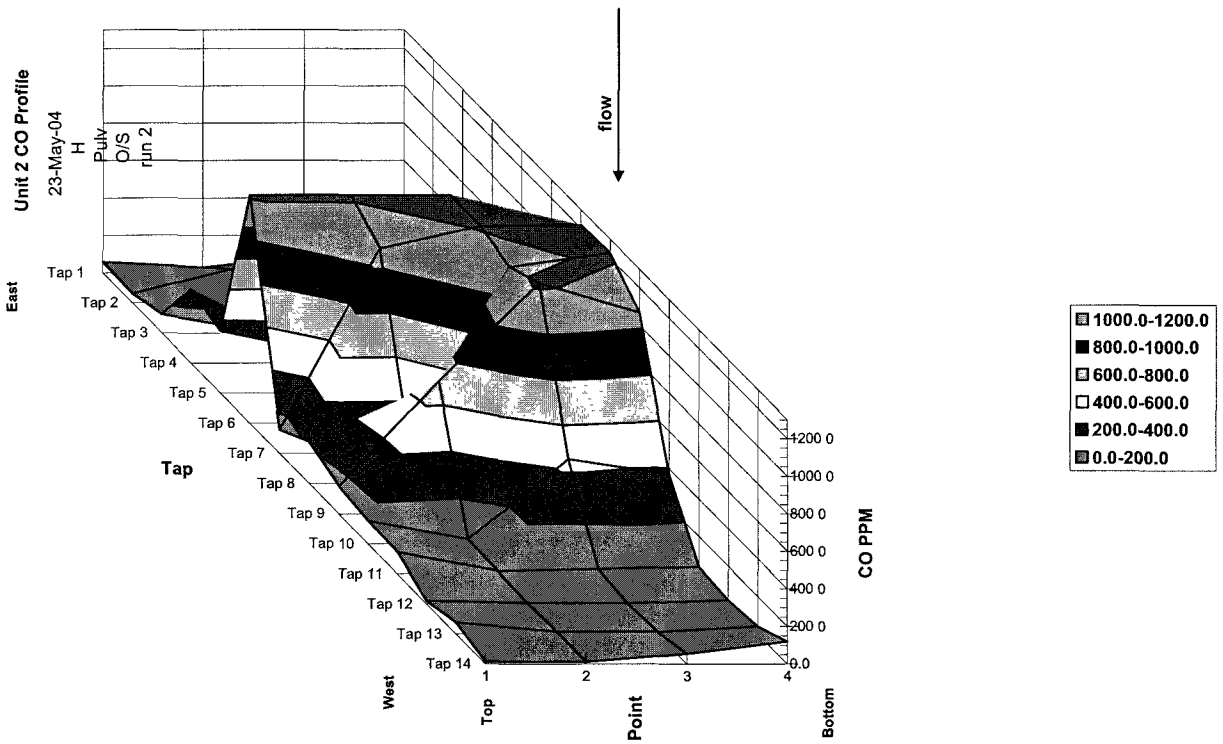


Fig 37 CO Profile 3D

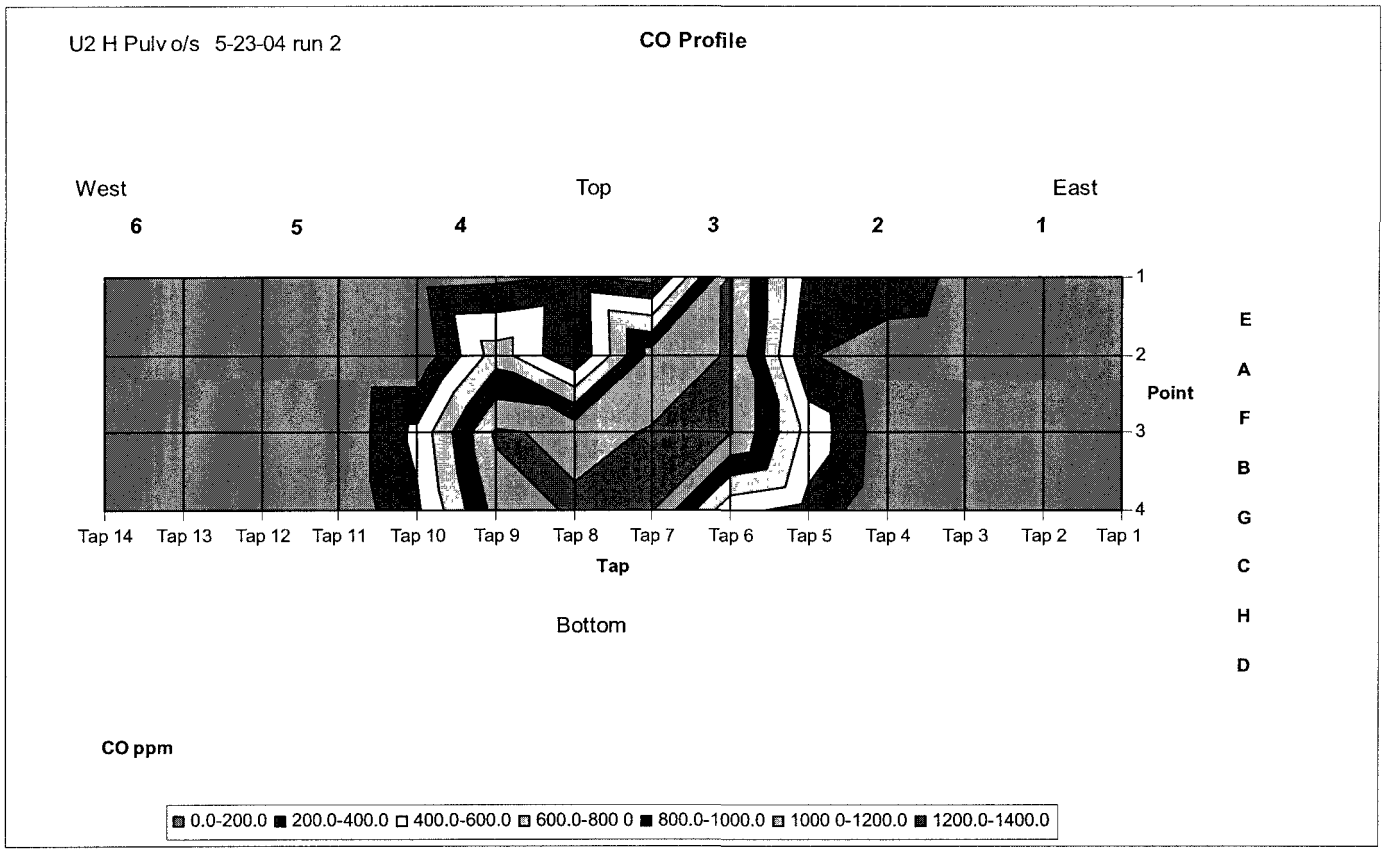


Fig 38 CO Profile 2D

Table 15: O2 grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	3.4	3.3	2.8	2.7	2.8	1.3	3.4	3.6	3.9	4.0	4.1	4.7	3.9	5.0
2	3.2	1.9	3.1	2.6	2.7	1.1	3.2	3.9	2.9	3.4	4.4	4.5	4.4	5.5
3	3.2	3.1	3.9	4.1	3.3	1.2	2.7	3.2	2.1	3.0	5.4	4.9	5.0	5.6
4	3.6	3.3	4.7	5.1	4.1	2.8	3.2	2.7	3.6	4.1	5.7	5.9	5.2	5.4

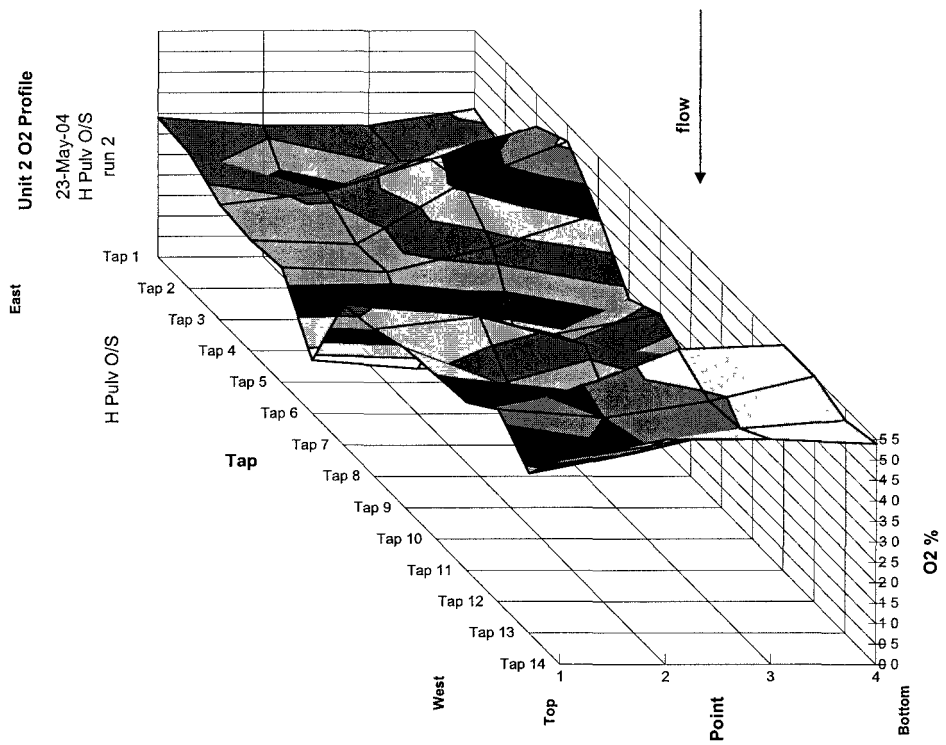


Fig 39 O2 Profile 3D

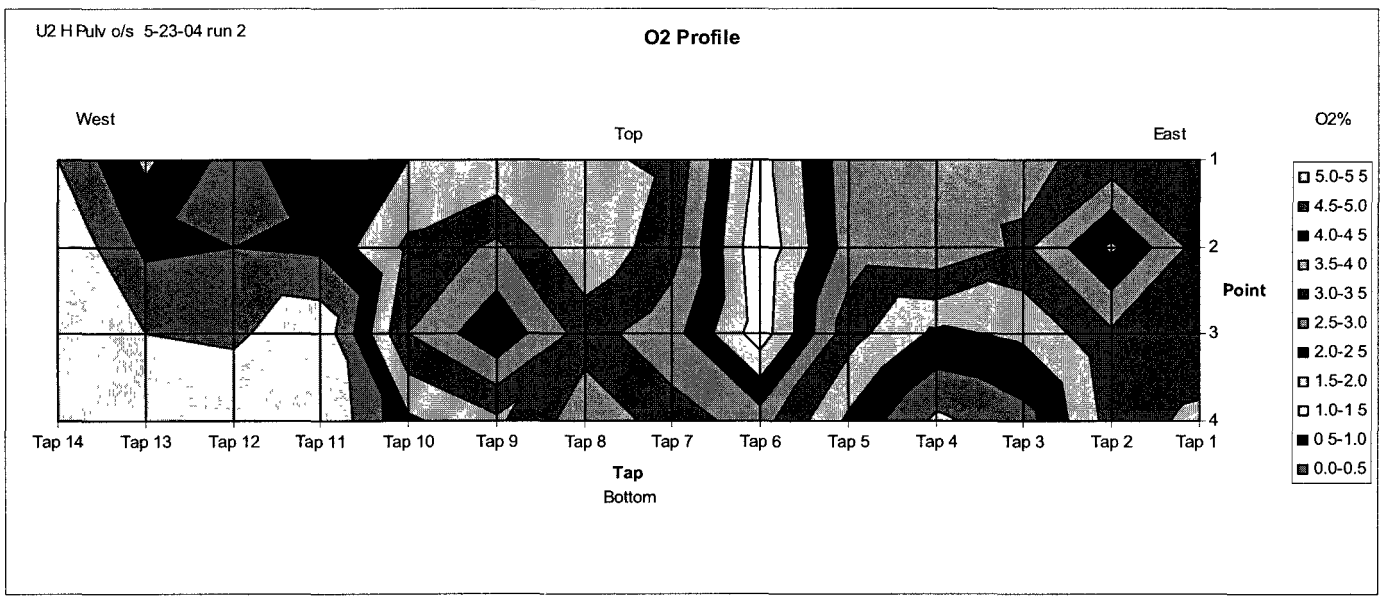


Fig 40 O2 Profile 2D

We closed H row middle burners and close the side burners to supply more air to the middle ones.

Table 16: Burner Settings

5/23/04	r12 Spin	H O/S Inner	Run2 Outer	5/23/04	r13 Spin	H O/S Inner	Run3 Outer
E1	3.75	1.5	6.5	E1	3.75	1.5	8.0
E2	3.75	1.5	5.1	E2	3.75	1.5	5.1
E3	4.25	1.5	4.6	E3	4.25	1.5	4.6
E4	4.5	1.5	4.7	E4	4.5	1.5	4.7
E5	3.75	1.5	5.4	E5	3.75	1.5	5.4
E6	4	0.5	12.0	E6	4	0.5	10.0
A1	3.75	1.5	8.6	A1	3.75	1.5	8.6
A2	3.75	1.5	6.8	A2	3.75	1.5	6.8
A3	4.25	1.5	6.1	A3	4.25	1.5	6.1
A4	4.25	1.5	6.3	A4	4.25	1.5	6.3
A5	3.75	1.5	7.1	A5	3.75	1.5	7.1
A6	4	0.5	10.0	A6	4	0.5	10.0
F1	4	0.5	10.0	F1	4	0.5	8.0
F2	3.75	1.5	5.4	F2	3.75	1.5	5.4
F3	4.25	1.5	4.8	F3	4.25	1.5	4.8
F4	4.25	1.5	5.2	F4	4.25	1.5	5.2
F5	3.75	1.5	5.6	F5	3.75	1.5	5.6
F6	4	0.5	10.0	F6	4	0.5	10.0
B1	5	0.5	14.0	B1	5	0.5	14.0
B2	3.75	1.5	8.0	B2	3.75	1.5	8.0
B3	3.75	1.5	7.1	B3	3.75	1.5	7.1
B4	3.75	1.5	7.6	B4	3.75	1.5	7.6
B5	3.75	1.5	8.4	B5	3.75	1.5	8.4
B6	4	0.5	14.0	B6	4	0.5	14.0
D1	3.75	1.5	8.0	D1	3.75	1.5	9.0
D2	3.5	1.5	4.7	D2	3.5	1.5	6.0
D3	3.5	1.5	4.5	D3	3.5	1.5	4.5
D4	3.75	1.5	4.8	D4	3.75	1.5	4.8
D5	3.75	1.5	7.0	D5	3.75	1.5	7.0
D6	5	1.5	10.3	**D6**	5	1.5	10.3
H1	3.75	1.5	9.7	H1	3.75	1.5	9.7
H2	3.75	1.5	7.4	H2	3.75	1.5	7.0
H3	3.75	1.5	6.6	H3	3.75	1.5	6.0
H4	3.75	1.5	6.8	H4	3.75	1.5	6.0
H5	3.75	1.5	7.7	H5	3.75	1.5	7.0
H6	3.75	1.5	9.5	H6	3.75	1.5	9.5
C1	3.75	1.5	9.0	C1	3.75	1.5	9.0
C2	3.75	1.5	6.7	C2	3.75	1.5	6.7
C3	3.75	1.5	6.0	C3	3.75	1.5	6.0
C4	3.75	1.5	6.2	C4	3.75	1.5	6.2
C5	5	1.5	7.0	C5	5	1.5	7.0
C6	5	0.5	11.0	C6	5	0.5	10.0
G1	4	1	12.6	G1	4	1	12.6
G2	3.75	1.5	10.0	G2	3.75	1.5	10.0
G3	3.75	1.5	8.9	G3	3.75	1.5	8.9
G4	3.75	1.5	9.2	G4	3.75	1.5	9.2
G5	4	0.5	11.0	G5	4	0.5	11.0
G6	4	0.5	14.0	G6	4	0.5	14.0

Table 17: CO grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	58.0	50.0	99.0	394.0	332.0	1217.0	124.0	221.0	148.0	124.0	117.0	15.0	61.0	14.0
2	29.0	180.0	4.7	36.0	218.0	1217.0	1092.0	200.0	705.0	23.0	16.0	6.0	14.0	11.0
3	84.0	41.0	20.0	73.0	534.0	1217.0	1210.0	1153.0	1228.0	451.0	27.0	4.0	13.0	56.0
4	142.0	123.0	66.0	46.0	326.0	456.0	1217.0	1228.0	1068.0	368.0	38.0	21.0	40.0	120.0

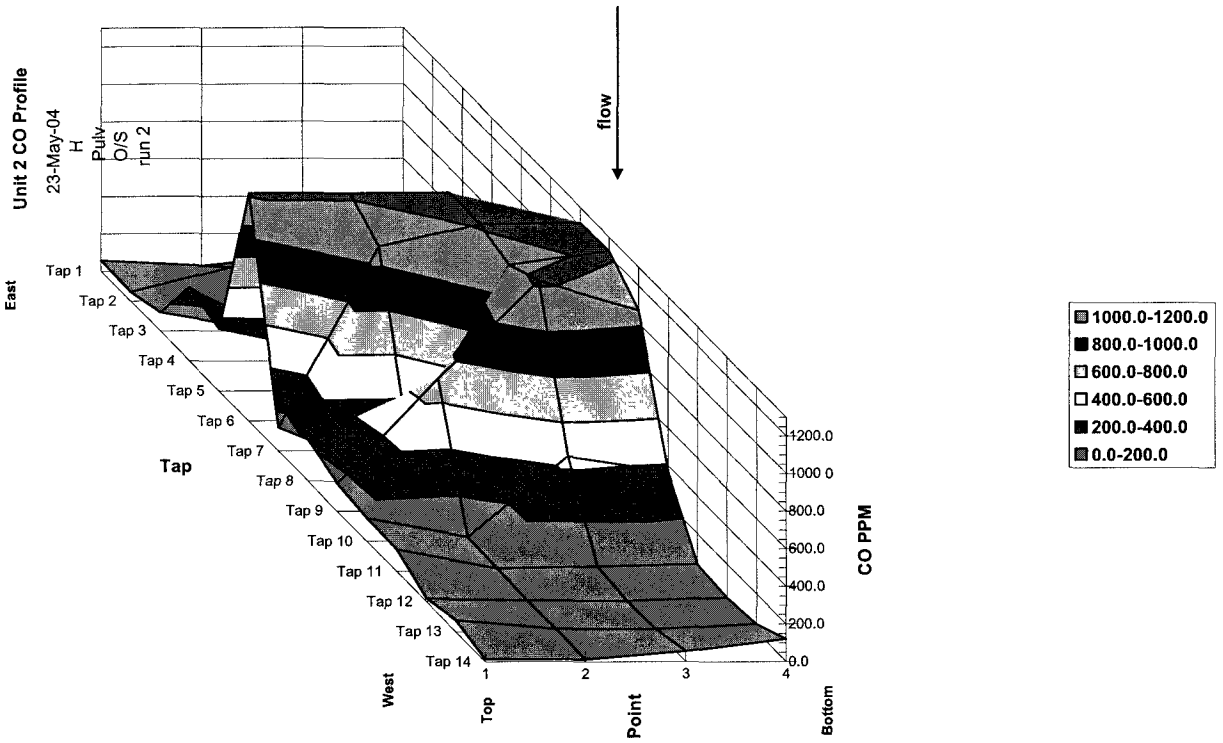


Fig 41 CO Profile 3D

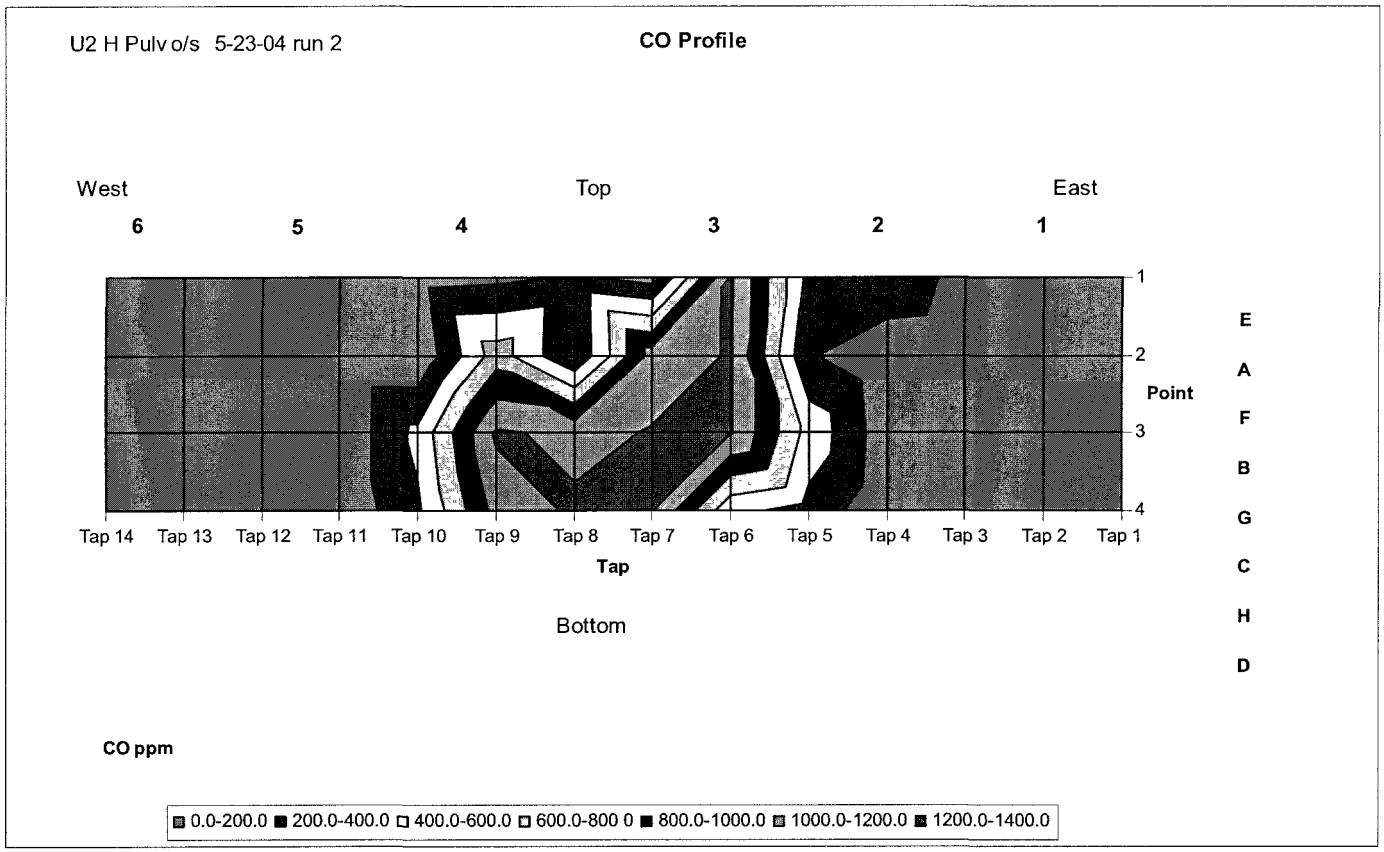


Fig 42 CO Profile 2D

Table 18: O2 grid reading

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	2.6	2.7	3.2	3.3	3.1	3.7	3.0	4.2	3.6	4.6	4.0	5.4	4.8	5.0
2	2.3	2.6	2.6	3.6	3.4	2.5	2.5	4.4	3.2	3.8	4.3	4.5	4.9	4.8
3	2.6	2.5	3.6	4.0	4.0	1.7	2.7	2.7	2.6	3.3	4.7	5.3	4.4	5.0
4	2.9	2.8	4.8	4.7	4.4	3.1	3.7	3.0	3.2	3.9	4.8	6.0	5.0	5.0

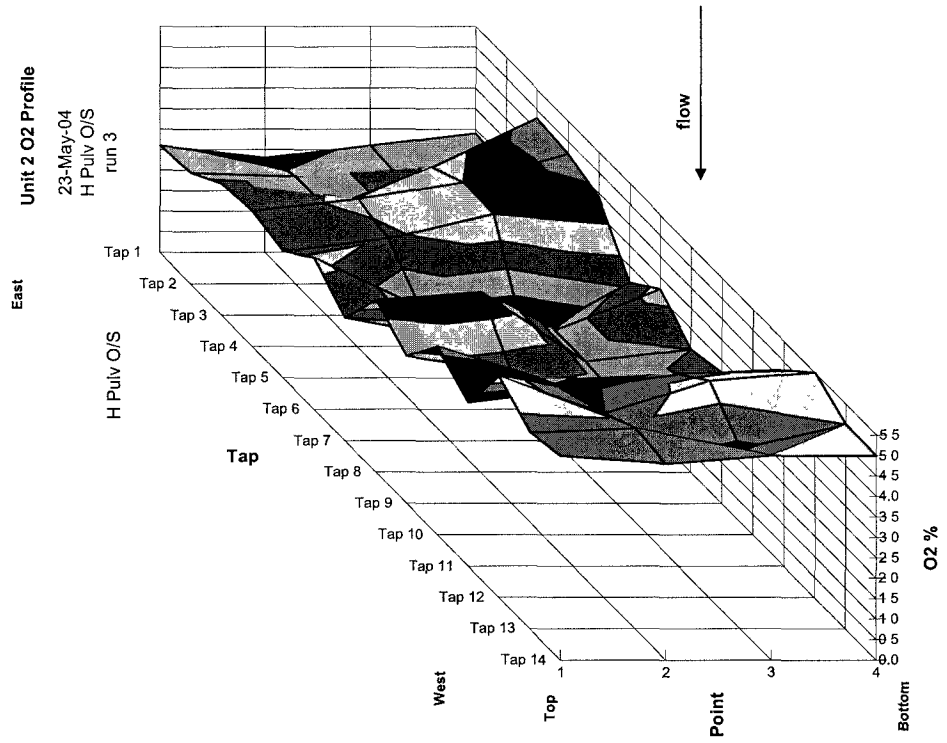


Fig 43 O2 Profile 3D

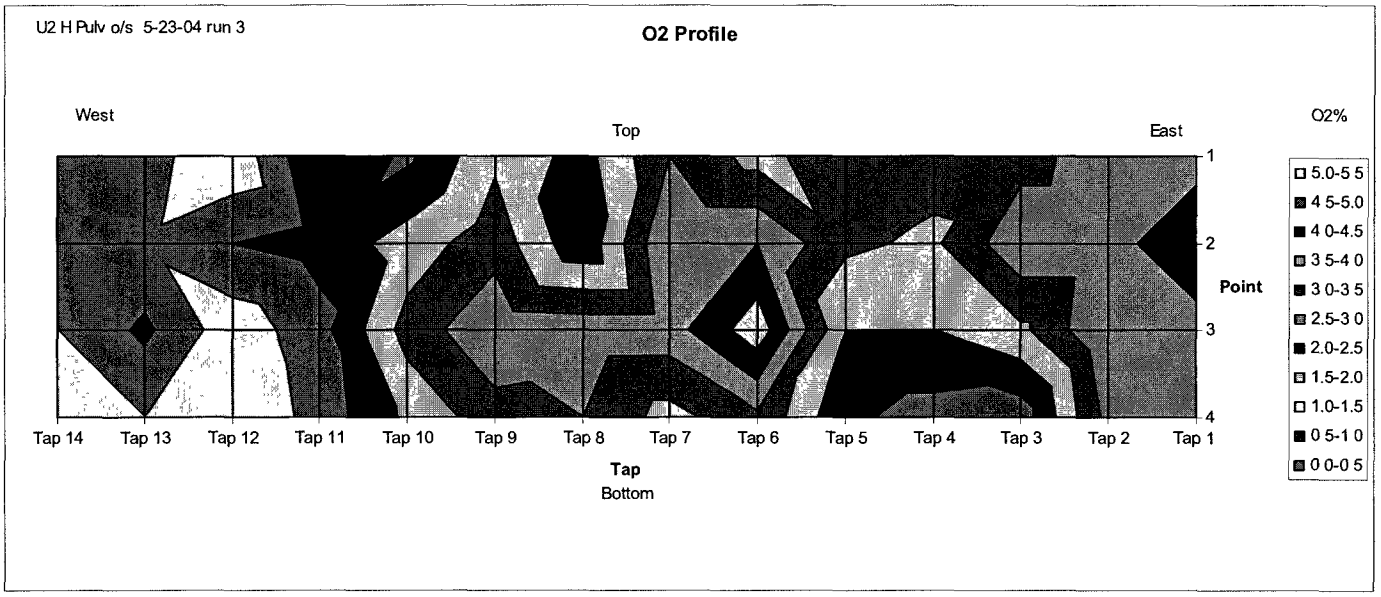


Fig 44 O2 Profile 2D

May 24th : At first Cooling air for burners O/S is 28% damper opening position, 10% opening is the limit for operation in DCS, ABT engineers asked power plant engineers to reduce the cooling air to minimum (10% opening).

Table 19: Burner Settings for Last profile and Current Profile

5/23/04	r13	H O/S	Run3		5/24/04	r14	A mill O/S
	Spin	**Inner**	**Outer**		**Spin**	**Inner**	**Outer**
E1	3.75	1.5	8.0	E1	3.75	1.5	8.0
E2	3.75	1.5	5.1	E2	3.75	1.5	5.1
E3	4.25	1.5	4.6	E3	4.25	1.5	5.5
E4	4.5	1.5	4.7	E4	4.5	1.5	5.5
E5	3.75	1.5	5.4	E5	3.75	1.5	5.4
E6	4	0.5	10.0	E6	4	0.5	10.0
A1	3.75	1.5	8.6	A1	3.75	1.5	8.6
A2	3.75	1.5	6.8	A2	3.75	1.5	6.8
A3	4.25	1.5	6.1	A3	4.25	1.5	6.1
A4	4.25	1.5	6.3	A4	4.25	1.5	6.3
A5	3.75	1.5	7.1	A5	3.75	1.5	7.1
A6	4	0.5	10.0	A6	4	0.5	10.0
F1	4	0.5	8.0	F1	4	0.5	8.0
F2	3.75	1.5	5.4	F2	3.75	1.5	5.4
F3	4.25	1.5	4.8	F3	4.25	1.5	4.8
F4	4.25	1.5	5.2	F4	4.25	1.5	5.2
F5	3.75	1.5	5.6	F5	3.75	1.5	5.6
F6	4	0.5	10.0	F6	4	0.5	10.0
B1	5	0.5	14.0	B1	5	0.5	14.0
B2	3.75	1.5	8.0	B2	3.75	1.5	9.0
B3	3.75	1.5	7.1	B3	3.75	1.5	9.0
B4	3.75	1.5	7.6	B4	3.75	1.5	9.0
B5	3.75	1.5	8.4	B5	3.75	1.5	9.0
B6	4	0.5	14.0	B6	4	0.5	14.0
D1	3.75	1.5	9.0	D1	3.75	1.5	9.0
D2	3.5	1.5	6.0	D2	3.5	1.5	6.0
D3	3.5	1.5	4.5	D3	3.5	1.5	5.5
D4	3.75	1.5	4.8	D4	3.75	1.5	5.5
D5	3.75	1.5	7.0	D5	3.75	1.5	7.0
D6	5	1.5	10.3	**D6**	5	1.5	10.3
H1	3.75	1.5	9.7	H1	3.75	1.5	9.7
H2	3.75	1.5	7.0	H2	3.75	1.5	7.0
H3	3.75	1.5	6.0	H3	3.75	1.5	6.0
H4	3.75	1.5	6.0	H4	3.75	1.5	6.0
H5	3.75	1.5	7.0	H5	3.75	1.5	7.0
H6	3.75	1.5	9.5	H6	3.75	1.5	9.5
C1	3.75	1.5	9.0	C1	3.75	1.5	9.0
C2	3.75	1.5	6.7	C2	3.75	1.5	6.7
C3	3.75	1.5	6.0	C3	3.75	1.5	6.0
C4	3.75	1.5	6.2	C4	3.75	1.5	6.2
C5	5	1.5	7.0	C5	5	1.5	7.0
C6	5	0.5	10.0	C6	5	0.5	10.0
G1	4	1	12.6	G1	4	1	12.6
G2	3.75	1.5	10.0	G2	3.75	1.5	10.0
G3	3.75	1.5	8.9	G3	3.75	1.5	8.9
G4	3.75	1.5	9.2	G4	3.75	1.5	9.2
G5	4	0.5	11.0	G5	4	0.5	11.0
G6	4	0.5	14.0	G6	4	0.5	14.0

With 28% Cooling air:

Table 20: Co Readings on Grids

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	455.0	652.0	695.0	103.0	447.0	43.0	36.0	116.0	193.0	142.0	92.0	53.0	36.0	34.0
2	1071.0	1124 0	1218.0	138.0	44.0	23.0	35.0	120.0	1106.0	40.0	25.0	10.0	7.0	15.0
3	308.0	932.0	262.0	50.0	19.0	198.0	354.0	401.0	1228.0	569.0	184.0	12.0	36.0	101.0
4	155.0	335.0	111.0	10.0	12.0	43.0	801.0	697.0	994.0	1031.0	490.0	209.0	117.0	92.0

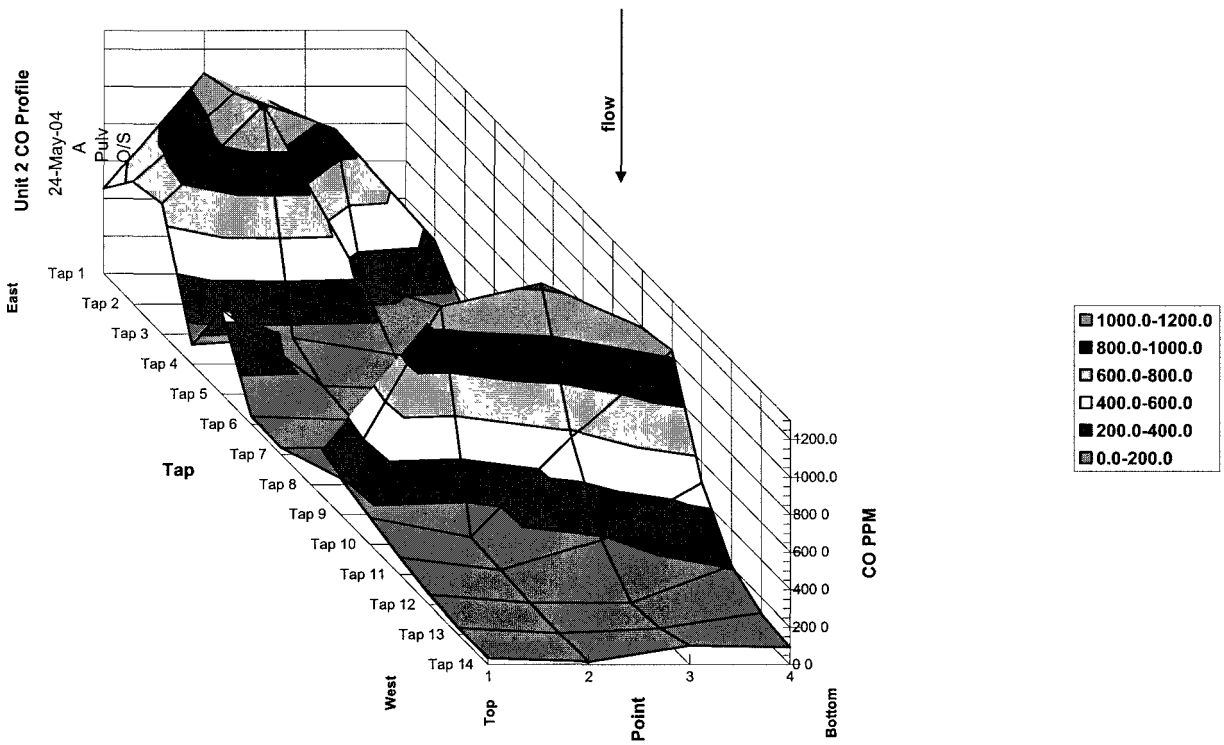


Fig 45 CO Profile 3D

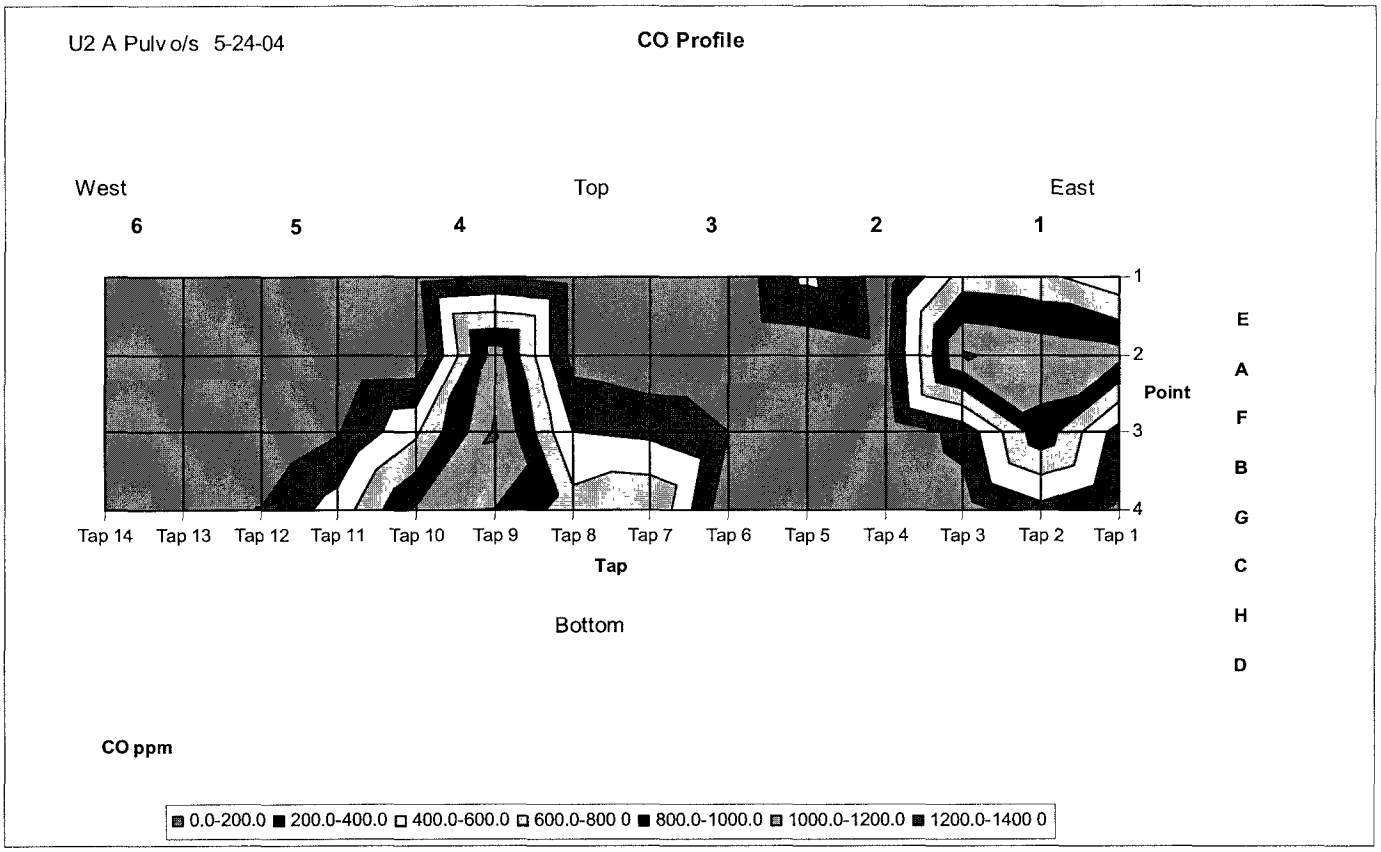


Fig 46 CO Profile 2D

Table 21: O2 Readings on Grids

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.6	1.6	1.6	2.4	2.2	3.1	3.7	4.1	4.9	5.0	5.1	5.2	5.0	5.0
2	1.4	0.8	0.6	2.2	3.0	3.6	3.3	4.2	3.0	5.4	5.3	5.3	4.7	4.4
3	2.0	1.9	3.3	4.6	4.2	4.1	3.7	3.3	2.3	3.6	3.6	5.1	4.1	4.7
4	2.5	2.2	4.7	6.5	5.3	5.1	4.6	3.1	3.1	2.7	3.5	4.0	4.1	4.4

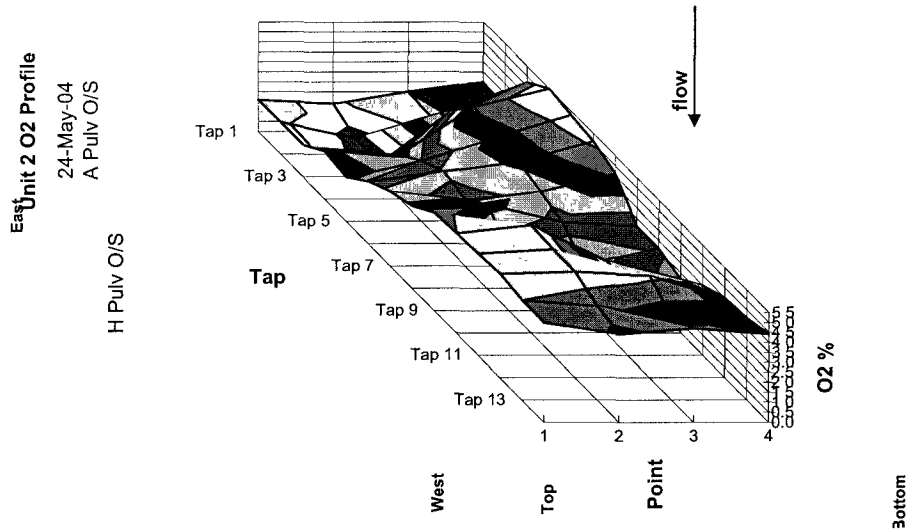


Fig 47 O2 Profile 3D

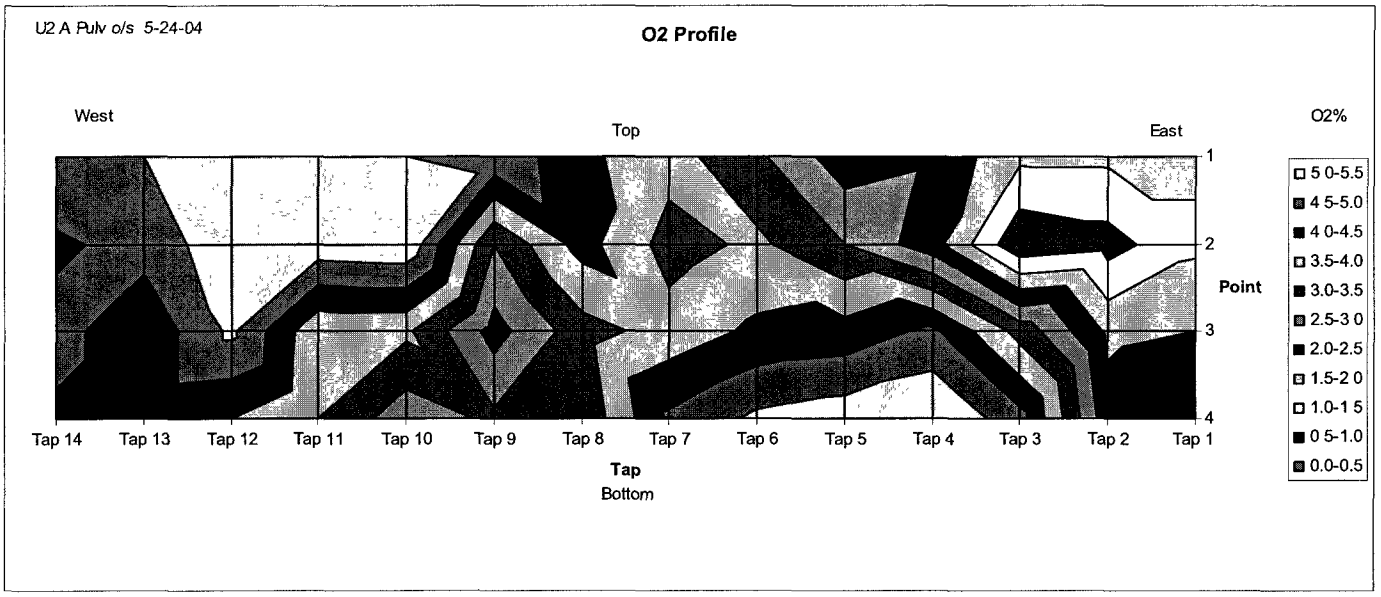


Fig 48 O2 Profile 3D

With 10% Cooling air and middle burner adjustments (in Red)

Table 22

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	258.0	341.0	1217.0	118.0	39.0	16.0	52.0	141.0	436.0	84.0	30.0	95.0	18.0	23.0
2	111.0	1175.0	1068.0	34.0	14.0	50.0	632.0	422.0	1063.0	10.0	42.0	11.0	10.0	10.0
3	628.0	328.0	63.0	14.0	19.0	29.0	501.0	108.0	1228.0	547.0	48.0	11.0	39.0	65.0
4	106.0	245.0	15.0	4.0	15.0	43.0	126.0	1228.0	1228.0	998.0	208.0	219.0	56.0	81.0

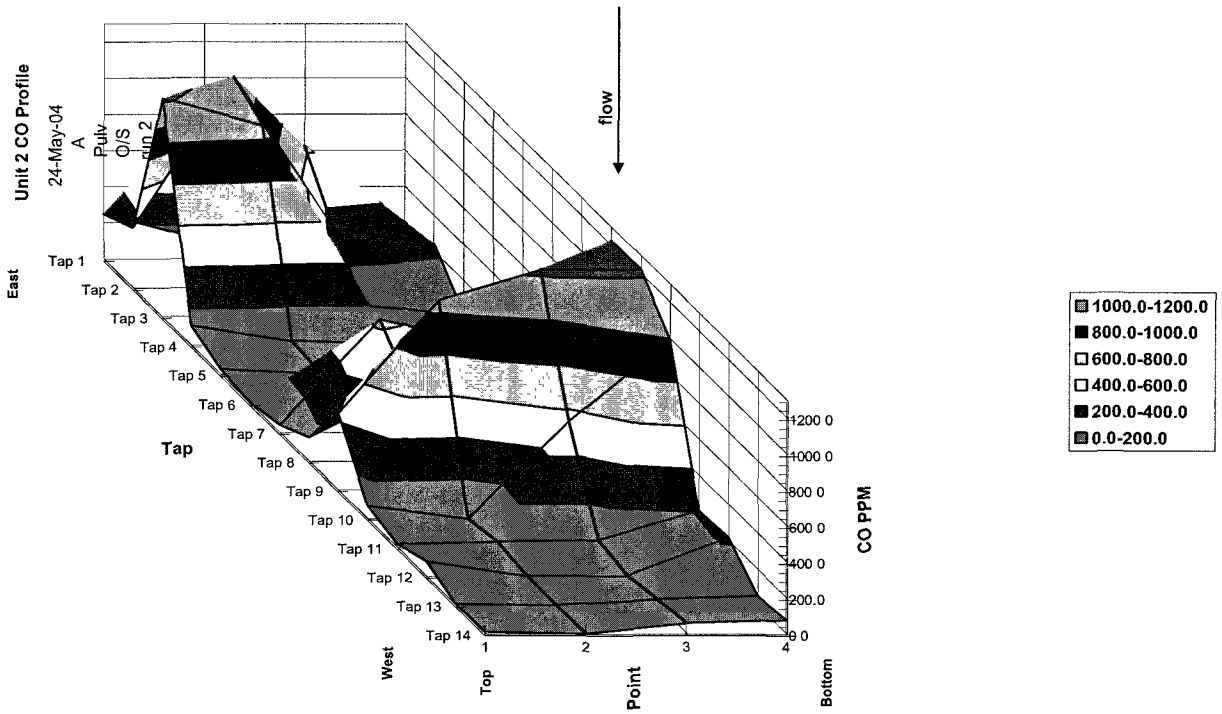


Fig 49 CO Profile 3D

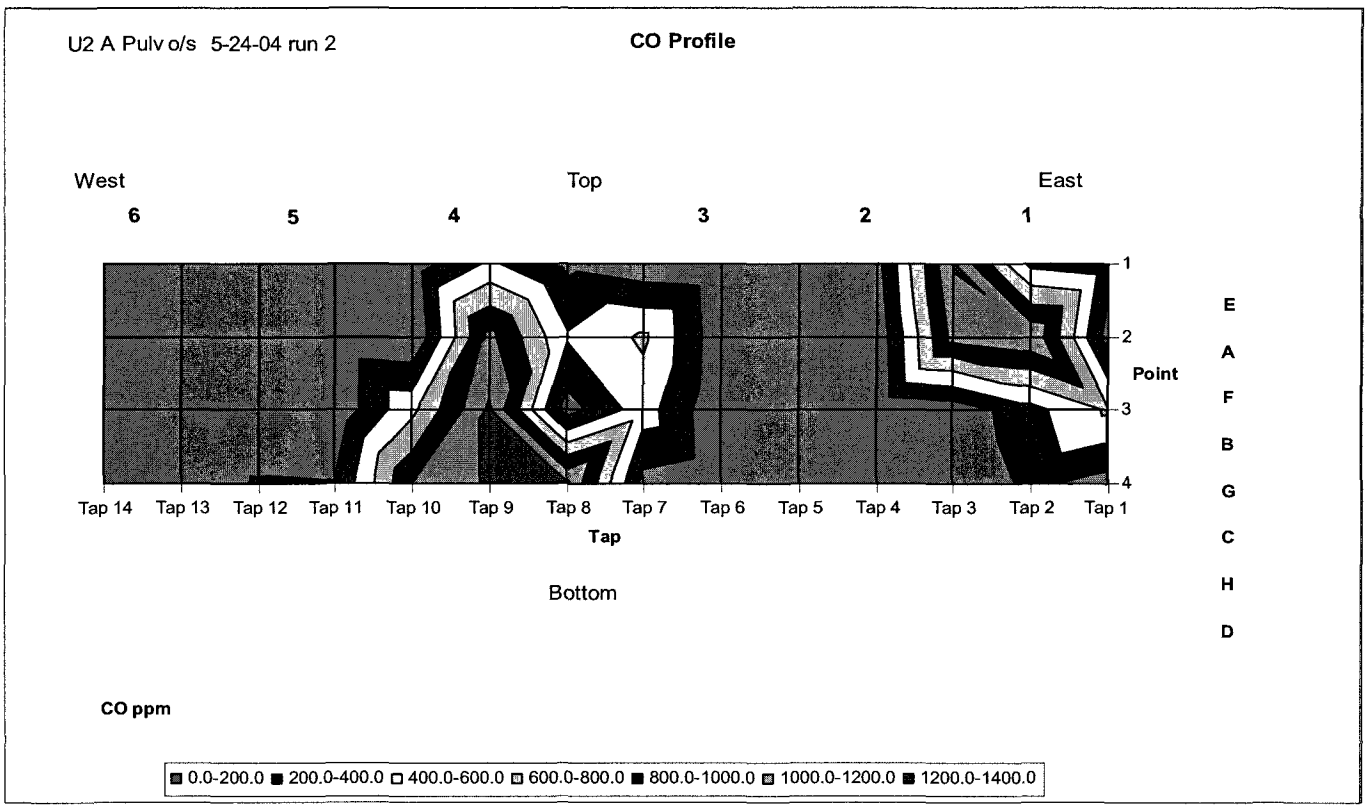


Fig 50 CO Profile 3D

Table 23

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	2.0	1.5	1.0	1.9	2.5	3 3	3.0	3.8	4.1	4.4	4.6	4.4	4.3	4.4
2	2.0	0.7	0.9	2.5	2.7	3.3	2.7	3.8	3.3	5.1	4.8	4.2	3.4	4.4
3	1.7	2.0	3.9	4.3	4.0	3.8	2.9	2.6	1.9	3.2	3.8	4.9	3.6	4.1
4	2.7	2.3	5.4	6.4	5.1	4.7	4.3	3.0	3.0	2.9	3.8	4 0	3.9	4.0

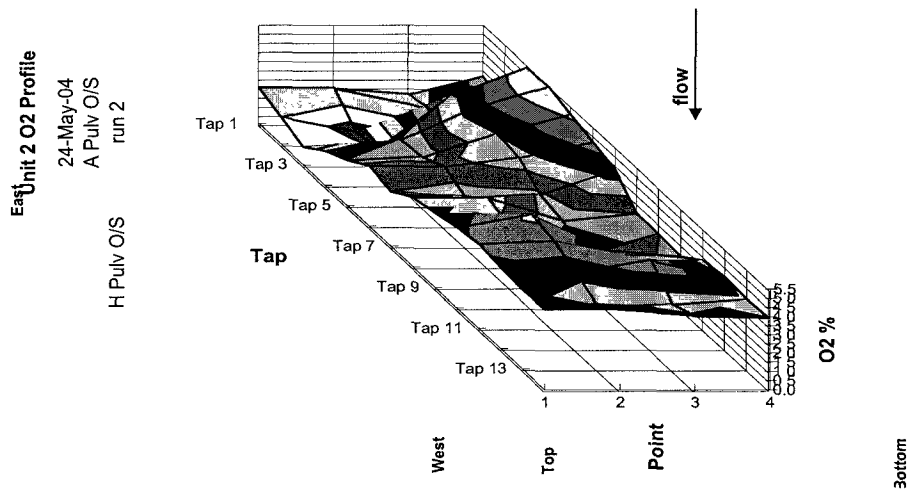


Fig 51 O2 Profile 3D

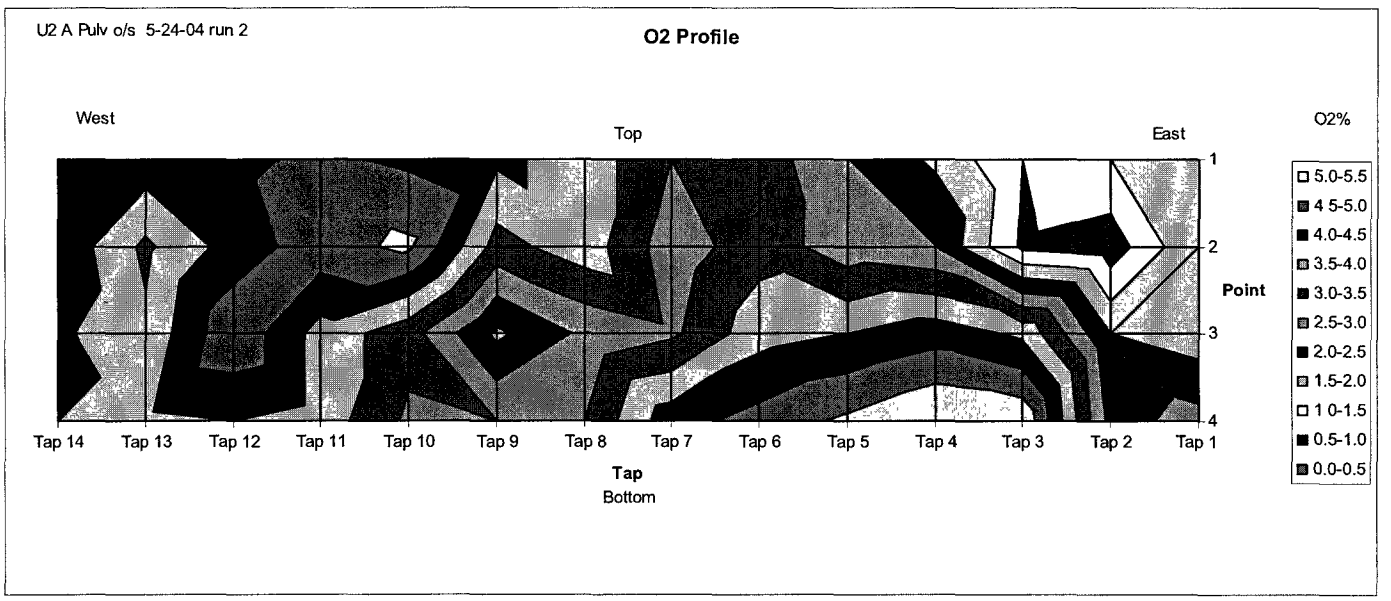


Fig 52 O2 Profile 2D

May 25th Testing for Inner zone effect on NOx.

Table 24: Burner Settings for Last profile and Current Profile

5/24/04	r14	A mill O/S			5/25/04	r15 Test1	A mill O/S	
	Spin	**Inner**	**Outer**		**Spin**	**Inner**	**Outer**
E1	3.75	1.5	8.0	E1	3.75	1.5	8.0
E2	3.75	1.5	5.1	E2	3.75	1.5	6.5
E3	4.25	1.5	5.5	E3	4.25	1.5	7.0
E4	4.5	1.5	5.5	E4	4.5	1.5	7.0
E5	3.75	1.5	5.4	E5	3.75	1.5	6.5
E6	4	0.5	10.0	E6	4	0.5	10.0
A1	3.75	1.5	8.6	A1	3.75	1.5	8.6
A2	3.75	1.5	6.8	A2	3.75	1.5	6.8
A3	4.25	1.5	6.1	A3	4.25	1.5	6.1
A4	4.25	1.5	6.3	A4	4.25	1.5	6.3
A5	3.75	1.5	7.1	A5	3.75	1.5	7.1
A6	4	0.5	10.0	A6	4	0.5	10.0
F1	4	0.5	8.0	F1	4	0.5	9.0
F2	3.75	1.5	5.4	F2	3.75	1.5	6.0
F3	4.25	1.5	4.8	F3	4.25	1.5	7.0
F4	4.25	1.5	5.2	F4	4.25	1.5	7.0
F5	3.75	1.5	5.6	F5	3.75	1.5	6.0
F6	4	0.5	10.0	F6	4	0.5	10.0
B1	5	0.5	14.0	B1	5	0.5	14.0
B2	3.75	1.5	9.0	B2	3.75	1.5	9.0
B3	3.75	1.5	9.0	B3	3.75	1.5	9.0
B4	3.75	1.5	9.0	B4	3.75	1.5	9.0
B5	3.75	1.5	9.0	B5	3.75	1.5	9.0
B6	4	0.5	14.0	B6	4	0.5	14.0
D1	3.75	1.5	9.0	D1	3.75	1.5	9.0
D2	3.5	1.5	6.0	D2	3.5	1.5	6.0
D3	3.5	1.5	5.5	D3	3.5	1.5	4.5
D4	3.75	1.5	5.5	D4	3.75	1.5	4.8
D5	3.75	1.5	7.0	D5	3.75	1.5	7.0
D6	5	1.5	10.3	**D6**	5	1.5	10.3
H1	3.75	1.5	9.7	H1	3.75	1.5	9.7
H2	3.75	1.5	7.0	H2	3.75	1.5	7.0
H3	3.75	1.5	6.0	H3	3.75	1.5	6.0
H4	3.75	1.5	6.0	H4	3.75	1.5	6.0
H5	3.75	1.5	7.0	H5	3.75	1.5	7.0
H6	3.75	1.5	9.5	H6	3.75	1.5	9.5
C1	3.75	1.5	9.0	C1	3.75	1.5	10.0
C2	3.75	1.5	6.7	C2	3.75	1.5	7.5
C3	3.75	1.5	6.0	C3	3.75	1.5	7.0
C4	3.75	1.5	6.2	C4	3.75	1.5	7.0
C5	5	1.5	7.0	C5	5	1.5	7.5
C6	5	0.5	10.0	C6	5	0.5	10.0
G1	4	1	12.6	G1	4	1	12.6
G2	3.75	1.5	10.0	G2	3.75	1.5	10.0
G3	3.75	1.5	8.9	G3	3.75	1.5	8.9
G4	3.75	1.5	9.2	G4	3.75	1.5	9.2
G5	4	0.5	11.0	G5	4	0.5	11.0
G6	4	0.5	14.0	G6	4	0.5	14.0

Table 25

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1218.0	1048.0	594.0	373.0	46.0	31.0	45 0	361.0	257.0	257.0	116.0	77.0	40.0	36.0
2	1218.0	1218.0	1218.0	58.0	13.0	125.0	108.0	34.0	243.0	700 0	269.0	55.0	5.0	22.0
3	1218.0	1034.0	383.0	26.0	37.0	52.0	125 0	60.0	837.0	80.0	47.0	11.0	11.0	21.0
4	1148.0	1183.0	69.0	7.0	43.0	51.0	53.0	98.0	339.0	386.0	461.0	113.0	33.0	30.0

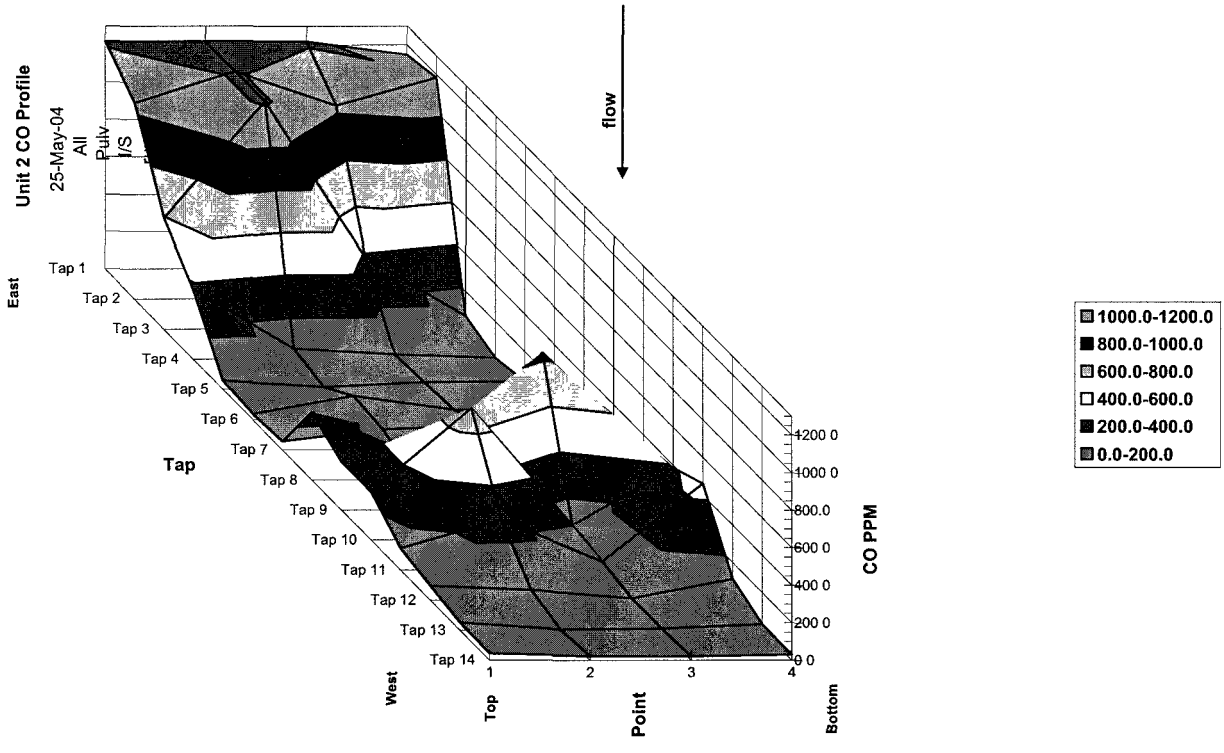


Fig 53 CO Profile 3D

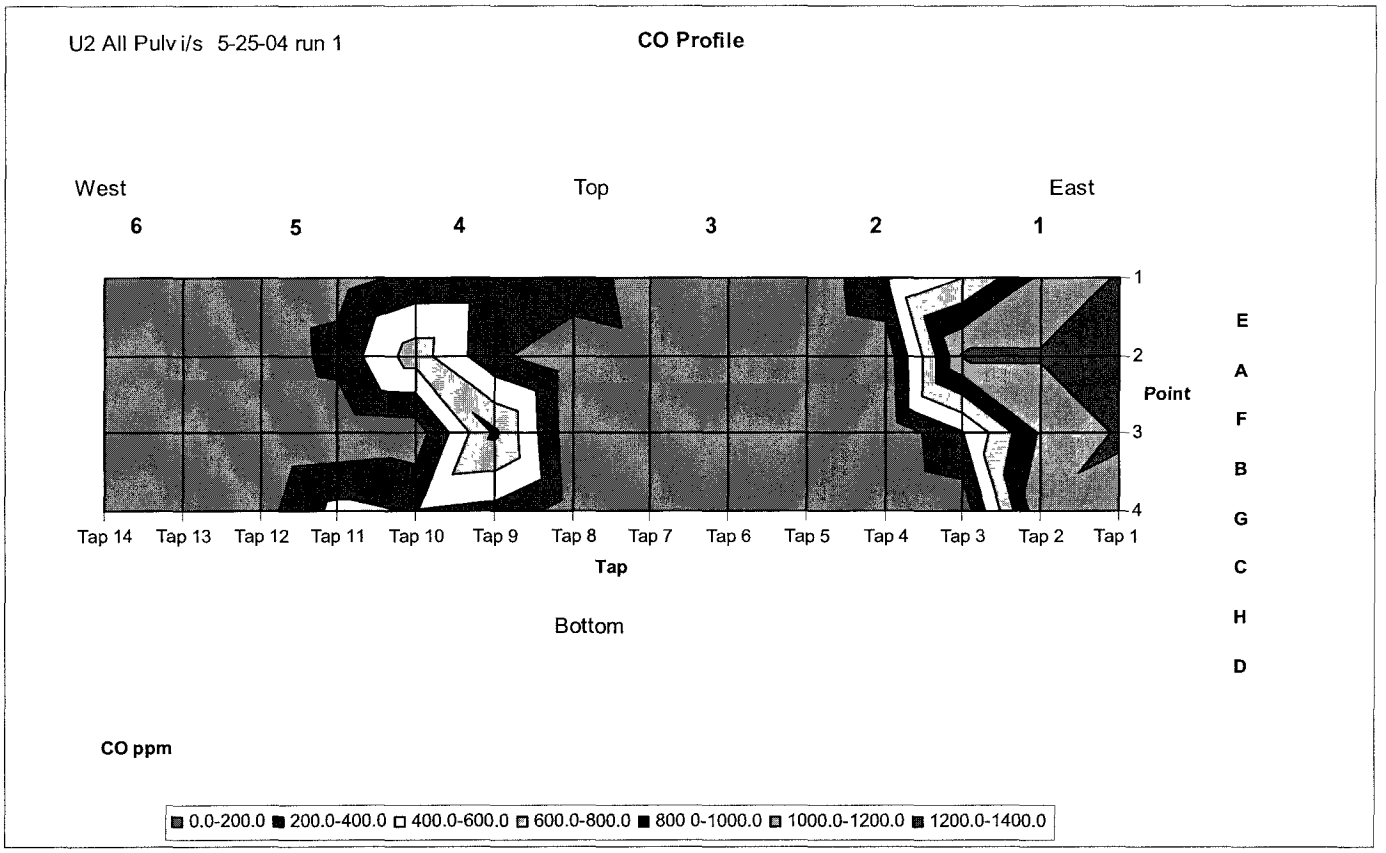


Fig 54 CO Profile 3D

Table 26

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.3	1.3	5.0	2.7	2.8	3.2	3.8	3.4	3.4	3.0	3.6	3.5	3.5	3.3
2	0.5	0.6	0.8	2.2	3.2	3.2	3.6	4.2	3.0	1.8	2.4	3.1	3.8	3.9
3	1.3	2.0	3.2	4.5	3.8	3.8	3.8	4.2	2.8	3.0	3.8	3.6	3.0	3.5
4	1.8	1.8	4.8	6.5	5.2	4.6	5.3	4.3	4.0	2.9	3.0	4.8	3.3	3.6

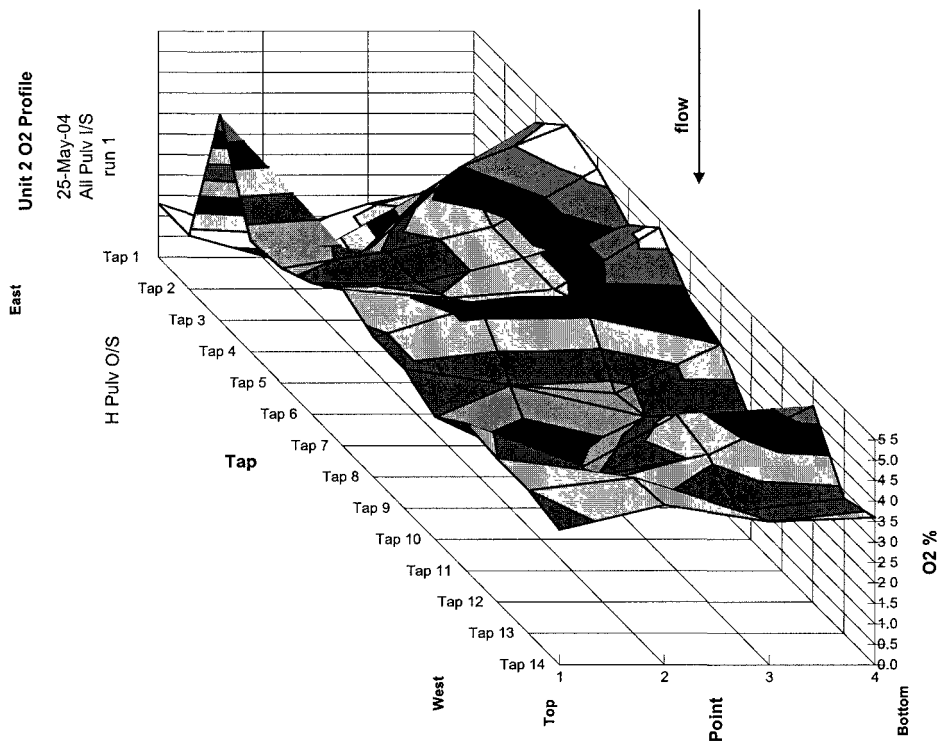


Fig 55 O2 Profile 3D

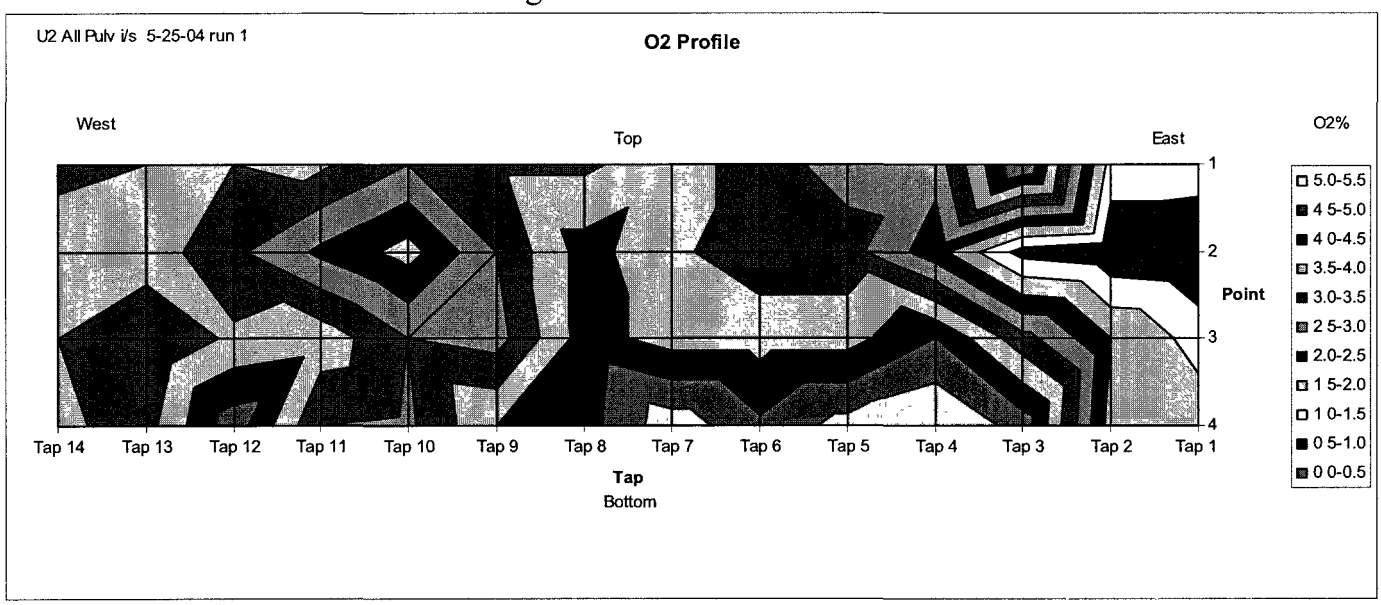


Fig 56 O2 Profile 2D

Run 2 Set all inner zone to 1":

Table 27

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1177.0	1115.0	1156.0	359.0	170.0	16.0	25.0	61.0	49.0	246.0	200.0	287.0	147.0	117.0
2	1218 0	1218.0	1218.0	49.0	24.0	36.0	34.0	83.0	628.0	590 0	323.0	51.0	98.0	42.0
3	1116.0	1218.0	416.0	131.0	23.0	12.0	289.0	254.0	180.0	468 0	132.0	124.0	57.0	50.0
4	1082.0	1218.0	49.0	10.0	30.0	31.0	33.0	160.0	408.0	796.0	549.0	201.0	152.0	48 0

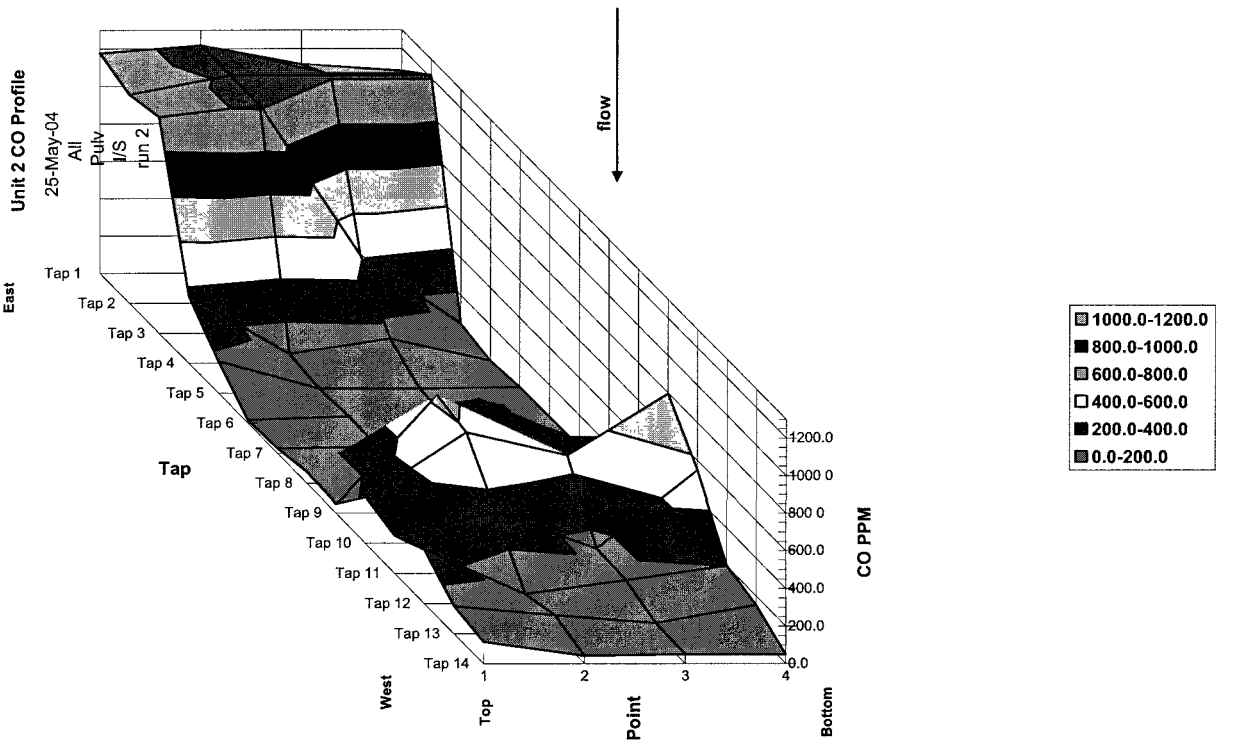


Fig 57 CO Profile 3D

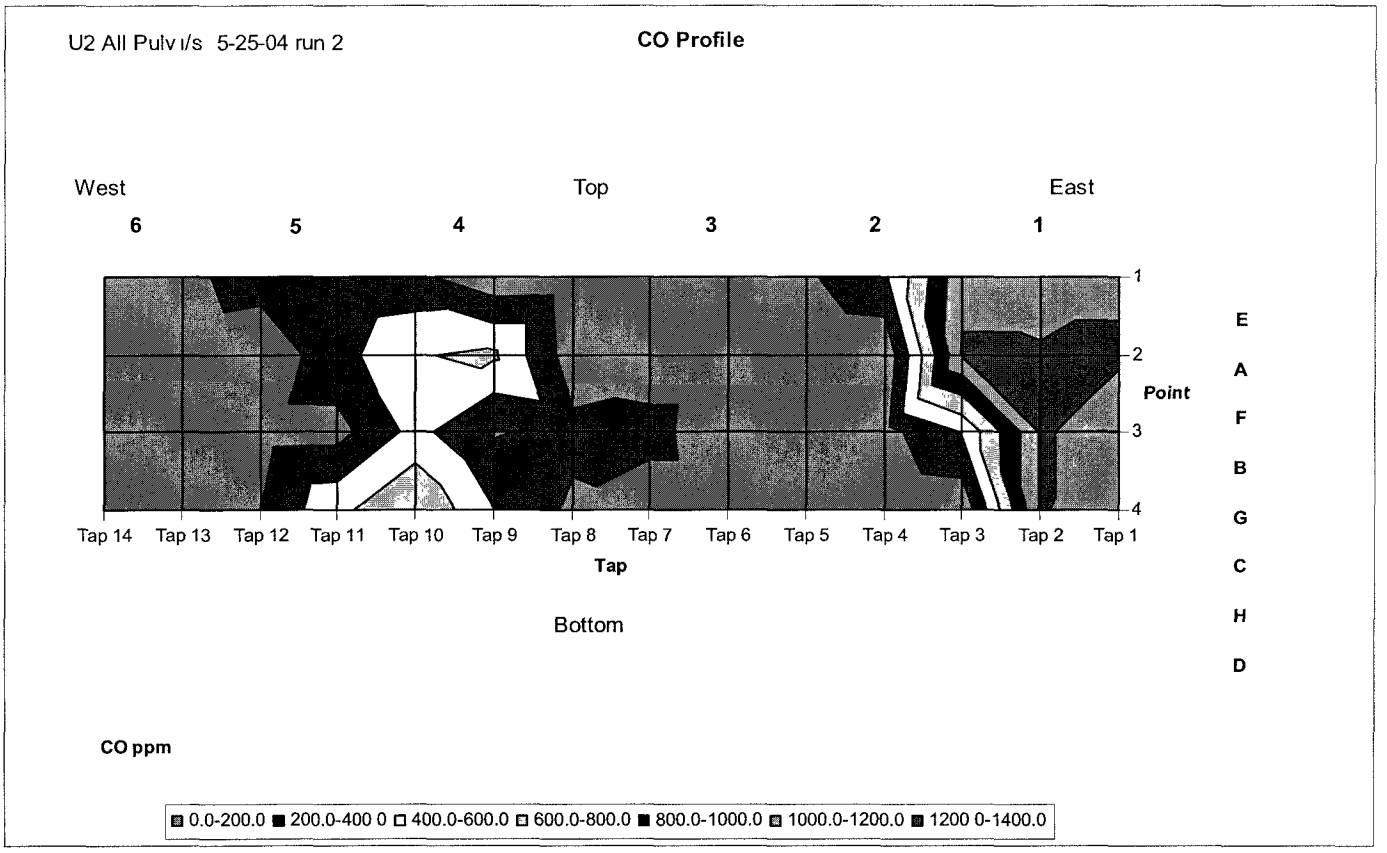


Fig 58 CO Profile 2D

Table 28 O2 Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	2.0	1.5	1.0	1.9	2.5	3.3	3.0	3.8	4.1	4.4	4.6	4.4	4.3	4.4
2	2.0	0.7	0.9	2.5	2.7	3.3	2.7	3.8	3.3	5.1	4.8	4.2	3.4	4.4
3	1.7	2.0	3.9	4.3	4.0	3.8	2.9	2.6	1.9	3.2	3.8	4.9	3.6	4.1
4	2.7	2.3	5.4	6.4	5.1	4.7	4.3	3.0	3.0	2.9	3.8	4.0	3.9	4.0

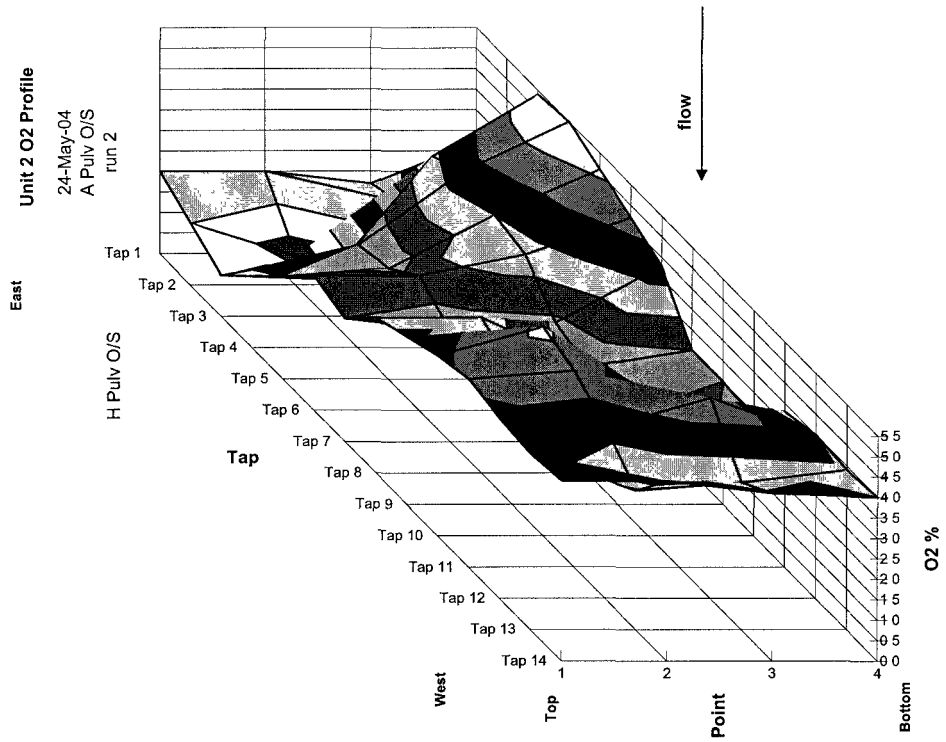


Fig 59 O2 Profile 3D

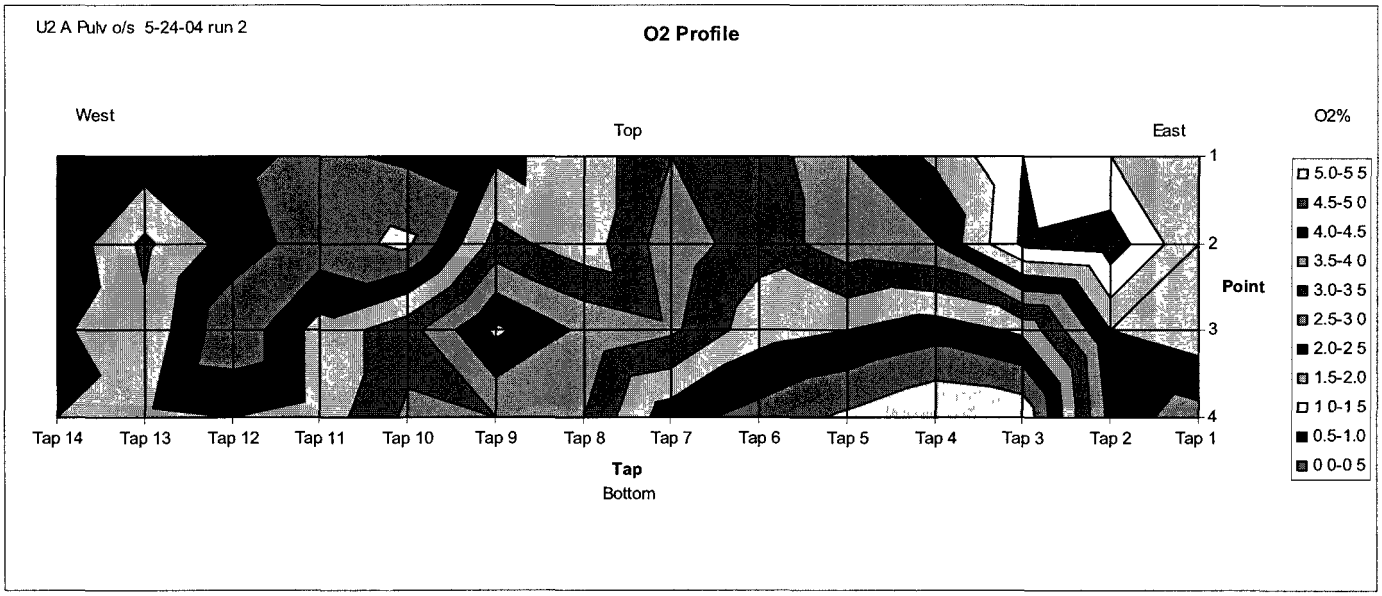


Fig 60 O2 Profile 2D

Run 3 Set all inner zone 0.5":

Table 29 CO Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1177 0	1115.0	1156.0	359.0	170.0	16.0	25.0	61.0	49.0	246.0	200.0	287.0	147.0	117.0
2	1218.0	1218.0	1218.0	49.0	24.0	36.0	34.0	83.0	628.0	590.0	323.0	51.0	98.0	42 0
3	1116 0	1218.0	416.0	131.0	23.0	12.0	289.0	254.0	180.0	468.0	132.0	124.0	57.0	50.0
4	1082.0	1218.0	49.0	10.0	30.0	31.0	33.0	160.0	408.0	796.0	549.0	201.0	152.0	48.0

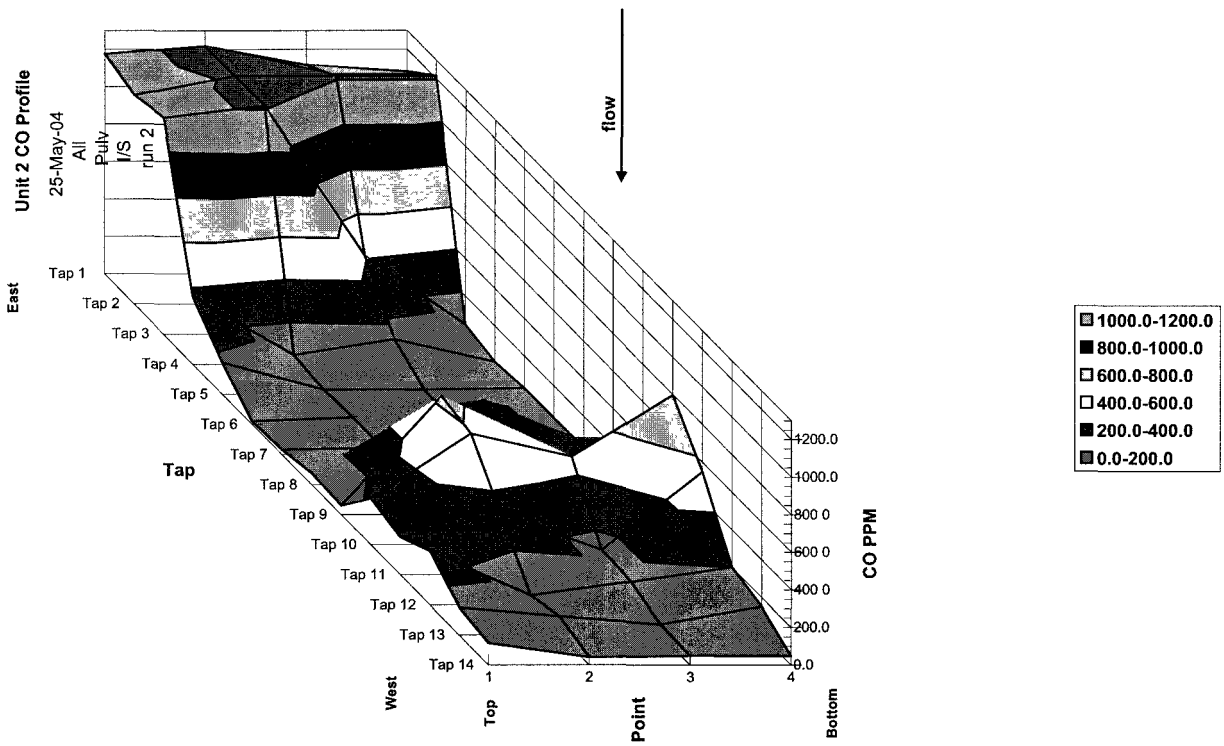


Fig 61 CO Profile 3D

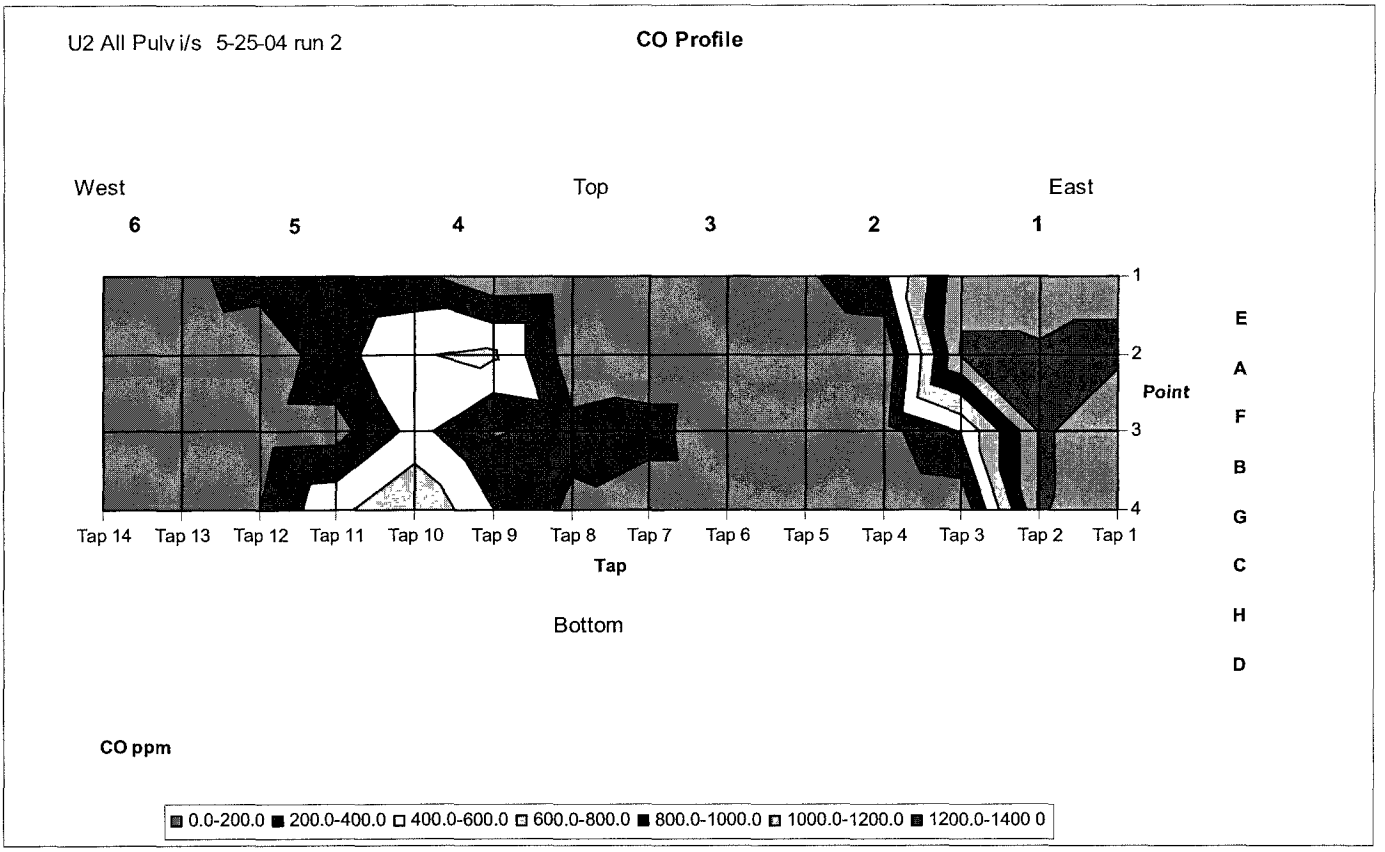


Fig 62 CO Profile 2D

Table 30 O2 Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.8	1.3	1.4	3.1	2.7	3.7	3.8	4.0	3.0	2.8	2.7	2.8	3.0	3.1
2	0.8	0.2	1.2	2.4	3.2	4.2	4.4	4.5	3.0	1.9	2.0	2.8	3.7	3.3
3	1.5	2.0	4.8	5.2	4.2	4.7	4.2	4.3	3.2	2.5	3.6	2.9	3.1	3.3
4	2.4	2.4	5.9	6.8	5.5	5.3	5.7	4.9	5.0	3.0	3.2	5.4	3.5	3.4

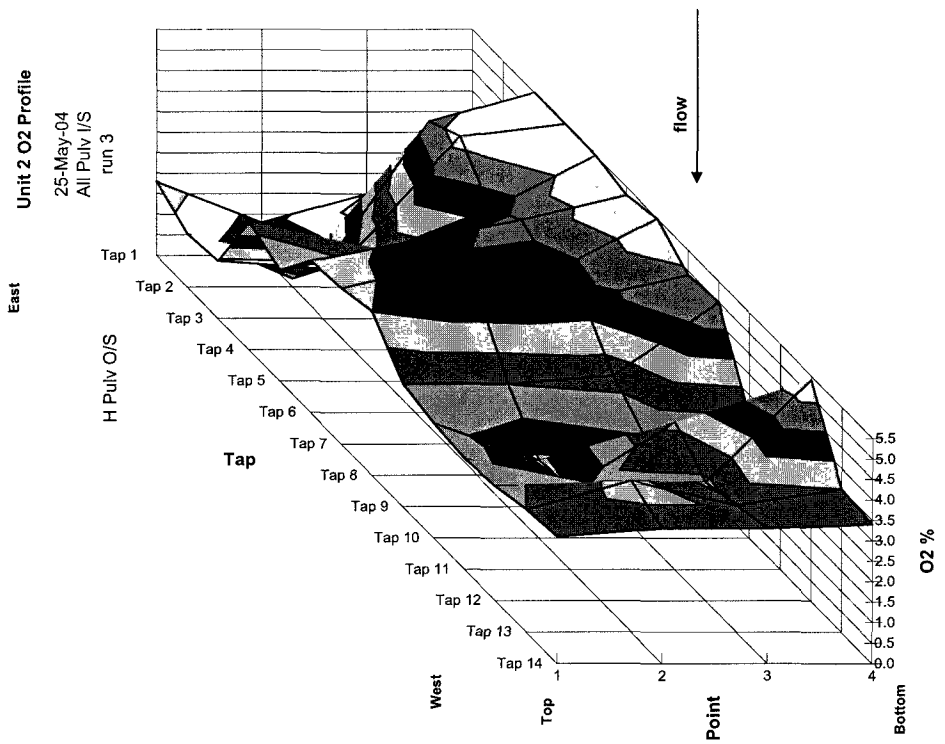


Fig 63 O2 Profile 3D

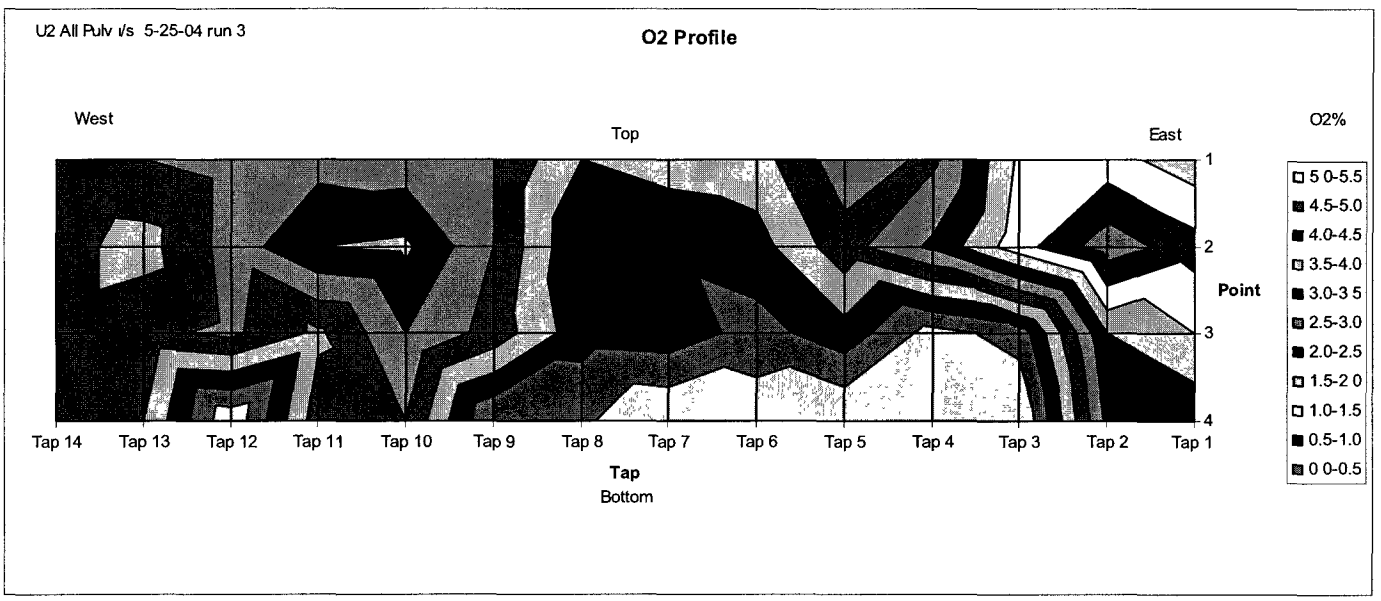


Fig 64 O2 Profile 2D

Run 4 Set all inner zone 1". ABT engineers surveyed bottom burners and found out west side bottom burners generated more smoke than the east side. So ABT engineers opened up several west side bottom burner's outer register and eliminated west side CO.

Table 31 CO Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1218.0	662.0	1218 0	67.0	50.0	11.0	7.0	5.0	8.0	3.0	7.0	5.0	4.0	6.0
2	1218.0	1218.0	956.0	70.0	34.0	11.0	6.0	4.0	9.0	3.0	15.0	5.0	4.0	5.0
3	1170.0	693.0	105.0	21.0	17.0	13.0	33.0	109.0	46.0	17.0	26.0	4.0	4.0	13.0
4	424.0	1187.0	87.0	7.0	10.0	17.0	11.0	251.0	72.0	131.0	58.0	4.0	9.0	6.0

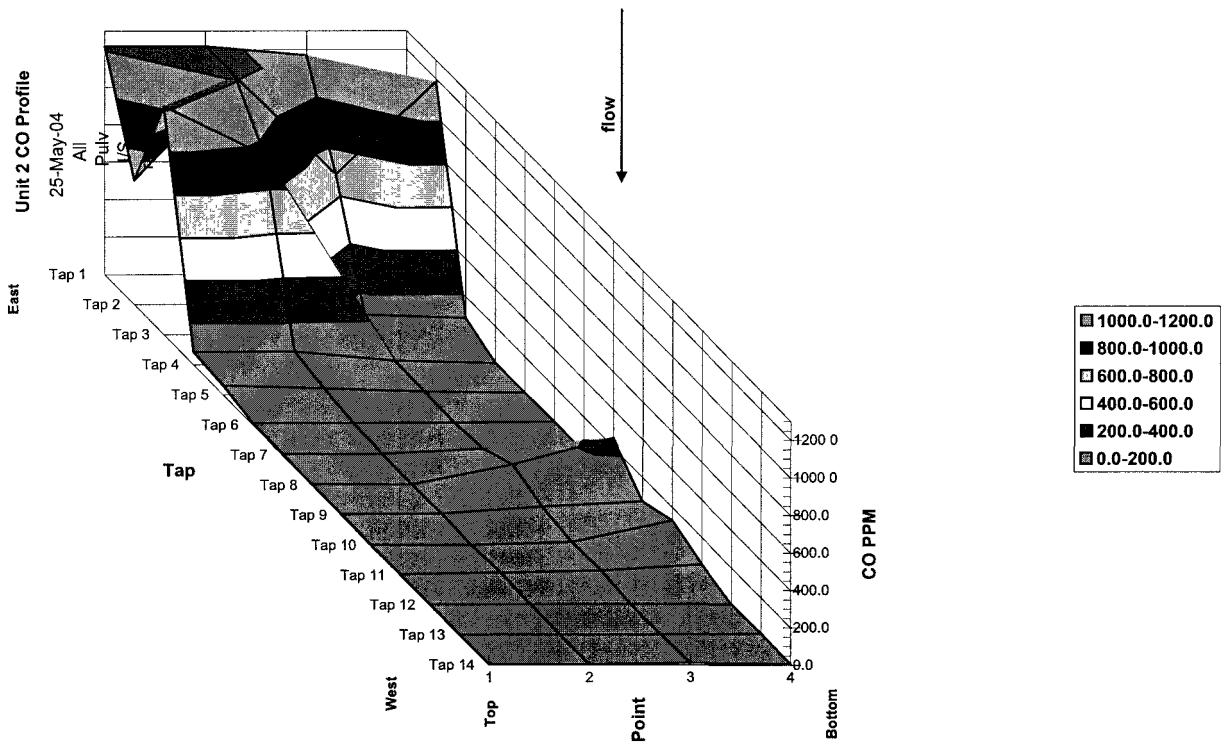


Fig 65 CO Profile 3D

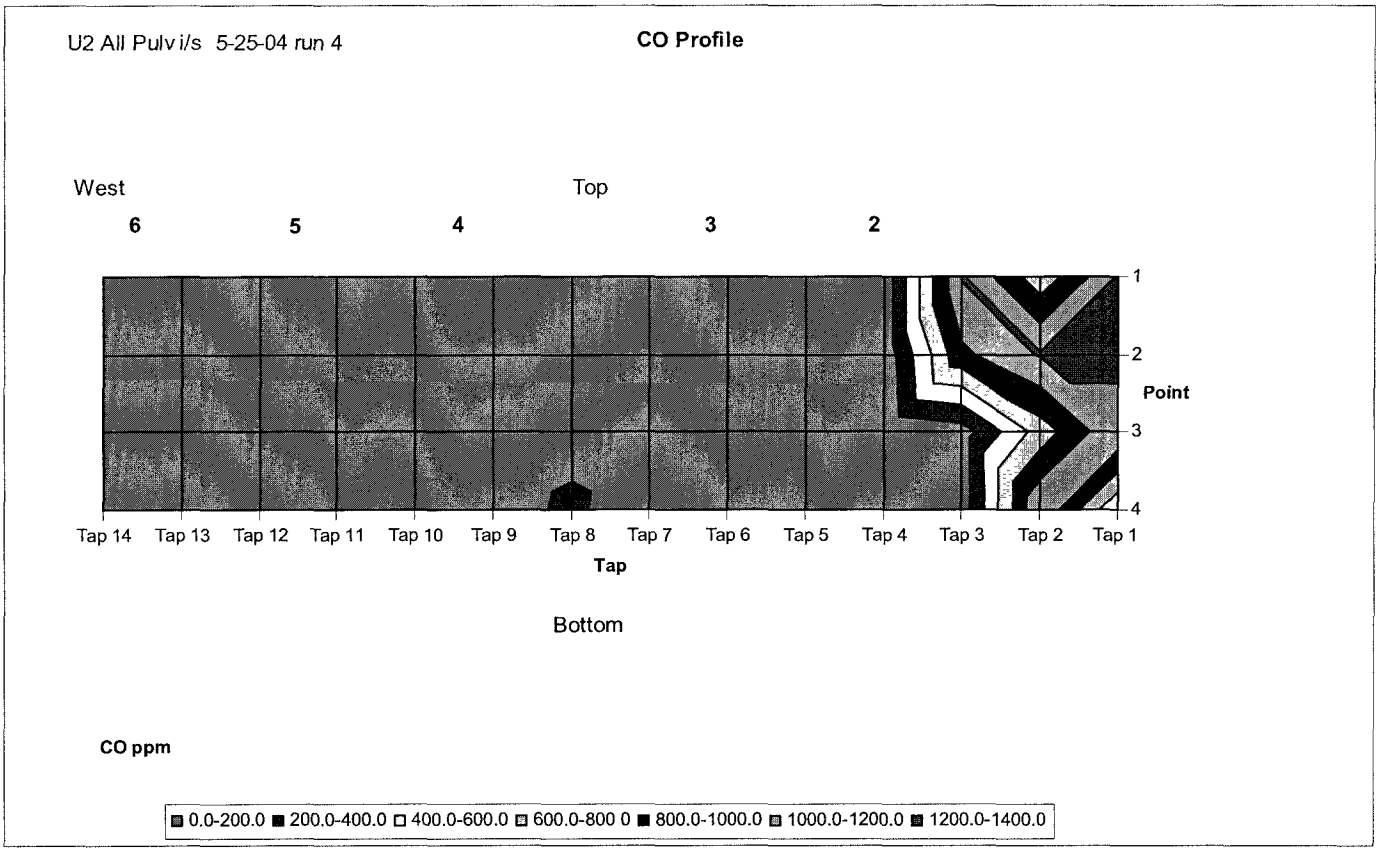


Fig 66 CO Profile 2D

Table 32 O2 Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	0.8	1.6	1.1	3.0	2.6	3.5	4.4	4.5	4.3	4.3	4.2	4.0	3.9	3.7
2	0.3	0.4	1.1	2.5	2.8	3.2	3.7	4.4	4.1	4.1	3.1	3.7	3.4	3.6
3	1.4	2.0	3.8	4.3	3.7	3.6	3.9	3.7	3.7	3.5	3.7	3.7	3.5	3.6
4	2.0	1.6	4.6	5.7	5.2	4.4	4.7	3.6	4.2	3.2	3.5	4.9	3.7	3.7

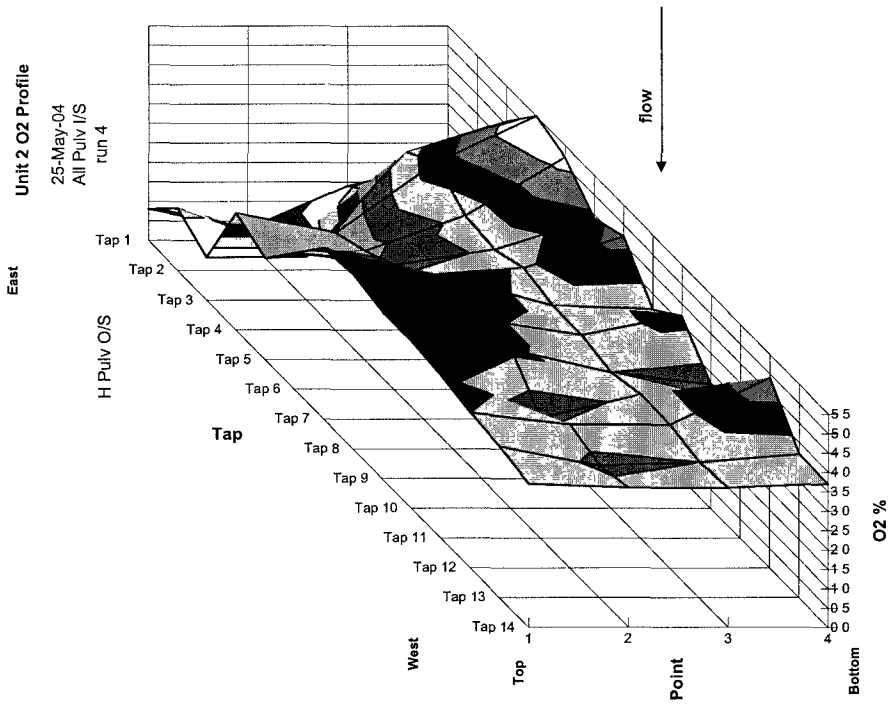


Fig 67 O2 Profile 3D

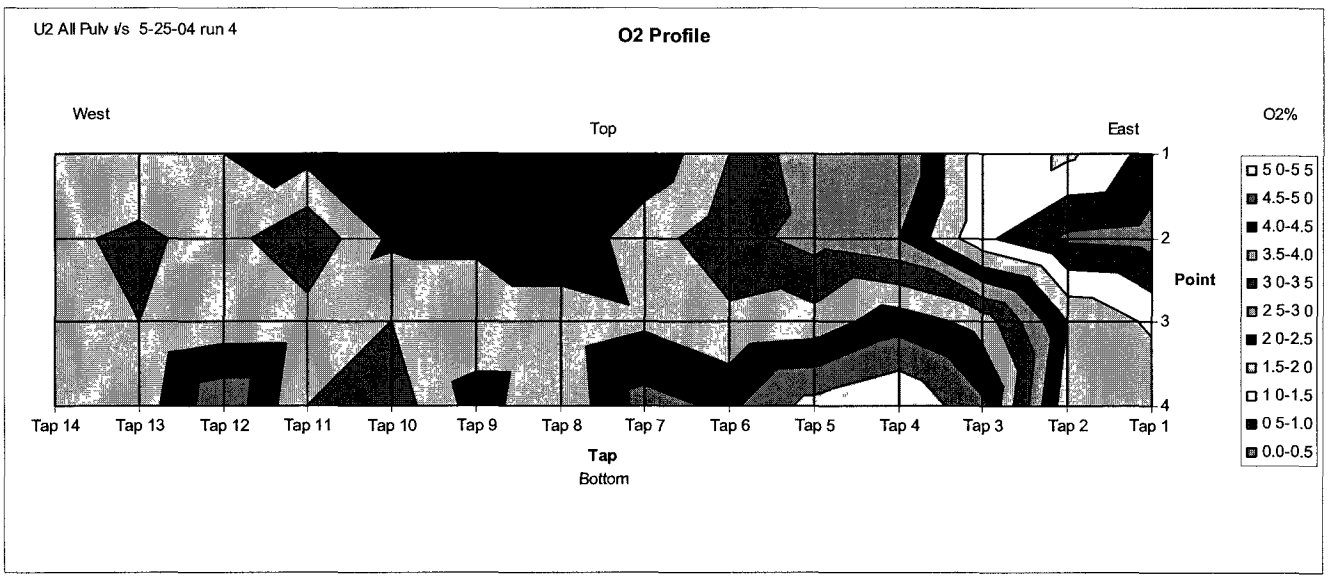


Fig 68 O2 Profile 3D

Table 33 Inner Air 's Setting vs NOx

	Inner Register	Nox
	1.5	0.33
	1.0	0.315
	0.5	0.325-0.33

May 26th

Table 34 Burner Settings for Last profile and Current Profile

5/25/04	r15 Test4	A mill O/S		5/26/04	r16 Test1	A mill O/S	
	Spin	**Inner**	**Outer**		**Spin**	**Inner**	**Outer**
E1	3.75	1	8.0	E1	3.75	1	8.0
E2	3.75	1	6.5	E2	3.75	1	6.5
E3	4.25	1	7.0	E3	4.25	1	6.0
E4	4.5	1	7.0	E4	4.5	1	6.0
E5	3.75	1	6.5	E5	3.75	1	6.5
E6	4	1	10.0	E6	4	1	10.0
A1	3.75	1	8.6	A1	3.75	1	8.6
A2	3.75	1	6.8	A2	3.75	1	6.8
A3	4.25	1	6.1	A3	4.25	1	6.1
A4	4.25	1	6.3	A4	4.25	1	6.3
A5	3.75	1	7.1	A5	3.75	1	7.1
A6	4	1	10.0	A6	4	1	10.0
F1	4	1	9.0	F1	4	1	9.0
F2	3.75	1	6.0	F2	3.75	1	6.0
F3	4.25	1	7.0	F3	4.25	1	7.0
F4	4.25	1	7.0	F4	4.25	1	7.0
F5	3.75	1	6.0	F5	3.75	1	6.0
F6	4	1	10.0	F6	4	1	10.0
B1	5	1	14.0	B1	5	1	14.0
B2	3.75	1	9.0	B2	3.75	1	9.0
B3	3.75	1	9.0	B3	3.75	1	9.0
B4	3.75	1	9.0	B4	3.75	1	9.0
B5	3.75	1	9.0	B5	3.75	1	9.0
B6	4	1	14.0	B6	4	1	14.0
D1	3.75	1	9.0	D1	3.75	1	9.0
D2	3.5	1	6.0	D2	3.5	1	5.5
D3	3.5	1	4.5	D3	3.5	1	4.5
D4	3.75	1	4.8	D4	3.75	1	4.5
D5	3.75	1	7.0	D5	3.75	1	5.5
D6	5	1	10.3	**D6**	5	1	10.3
H1	3.75	1	9.7	H1	3.75	1	9.7
H2	3.75	1	7.0	H2	3.75	1	7.0
H3	3.75	1	6.0	H3	3.75	1	6.0
H4	3.75	1	6.0	H4	3.75	1	6.0
H5	3.75	1	7.0	H5	3.75	1	7.0
H6	3.75	1	9.5	H6	3.75	1	9.5
C1	3.75	1	10.0	C1	3.75	1	10.0
C2	3.75	1	7.5	C2	3.75	1	7.5
C3	3.75	1	7.0	C3	3.75	1	7.0
C4	3.75	1	7.0	C4	3.75	1	7.0
C5	5	1	7.5	C5	5	1	7.5
C6	5	1	10.0	C6	5	1	10.0
G1	4	1	12.6	G1	4	1	12.6
G2	3.75	1	10.0	G2	3.75	1	9.0
G3	3.75	1	8.9	G3	3.75	1	8.9
G4	3.75	1	9.2	G4	3.75	1	11.5
G5	4	1	11.0	G5	4	1	12.5
G6	4	1	14.0	G6	4	1	14.0

Table 35 CO Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	540.0	873.0	359.0	80.0	41.0	27.0	13.0	32.0	17.0	11.0	7.0	4.0	4.0	5 0
2	900.0	1218.0	684.0	48.0	31.0	29.0	15.0	12 0	193.0	7.0	6.0	3.0	3.0	4.0
3	1063.0	1090.0	23.0	25.0	17.0	93.0	25.0	17.0	281.0	133.0	18.0	3.0	4.0	7.0
4	341.0	456.0	115.0	5.0	16.0	80.0	62.0	198.0	307.0	103.0	19.0	7.0	20.0	17.0

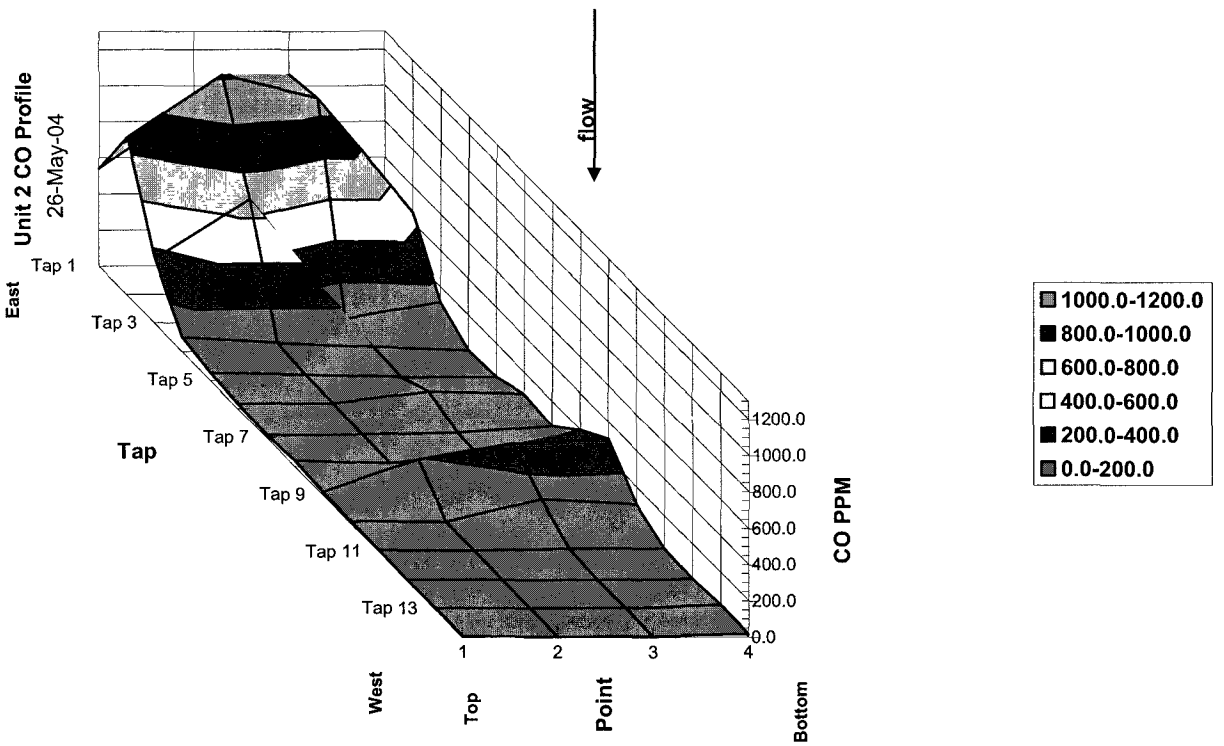


Fig 69 CO Profile 3D

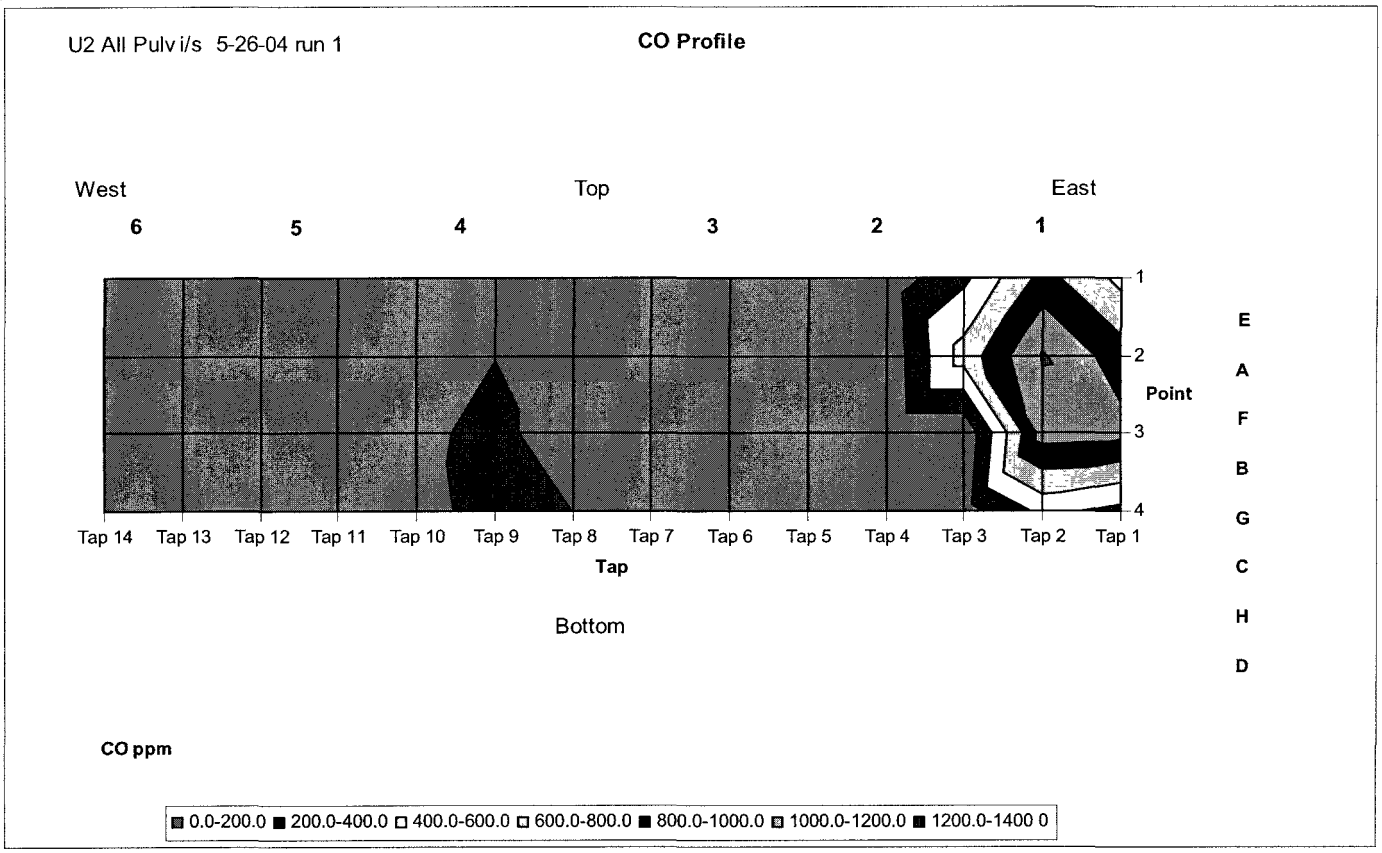


Fig 70 CO Profile 3D

Table 36 O2 Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.5	1.3	1.7	2.2	2.6	2.8	3.0	4.2	4.0	3.7	4.0	4.2	4.2	4.0
2	1.0	0.8	1.5	2.2	2.7	3.4	3.7	4.3	2.9	3.6	3.7	4.0	3.8	4.0
3	1.4	1.5	3.7	3.5	3.5	3.1	3.6	4.1	2.6	2.8	3.9	3.8	3.7	4.0
4	2.1	2.2	4.0	4.9	4.1	3.7	4.0	3.7	3.5	4.2	4.9	5.2	4.0	4.0

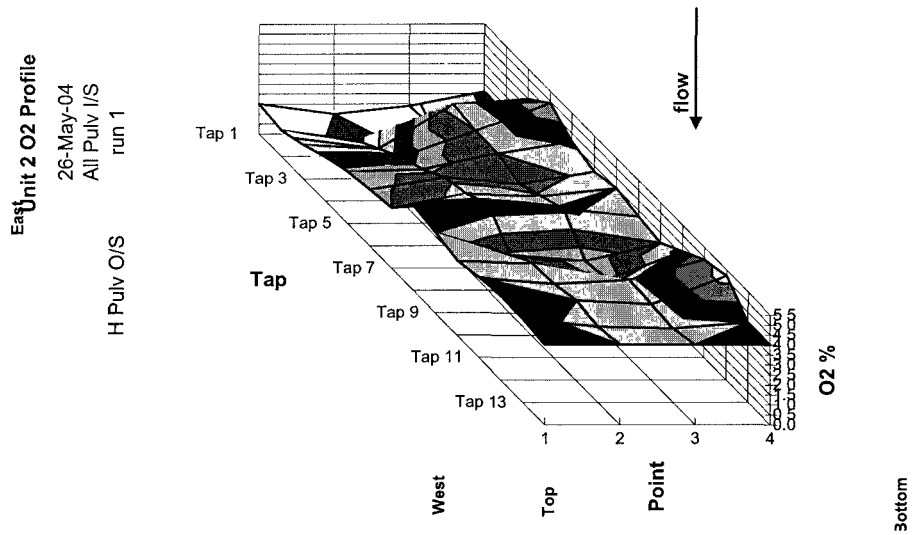


Fig 71 O2 Profile 3D

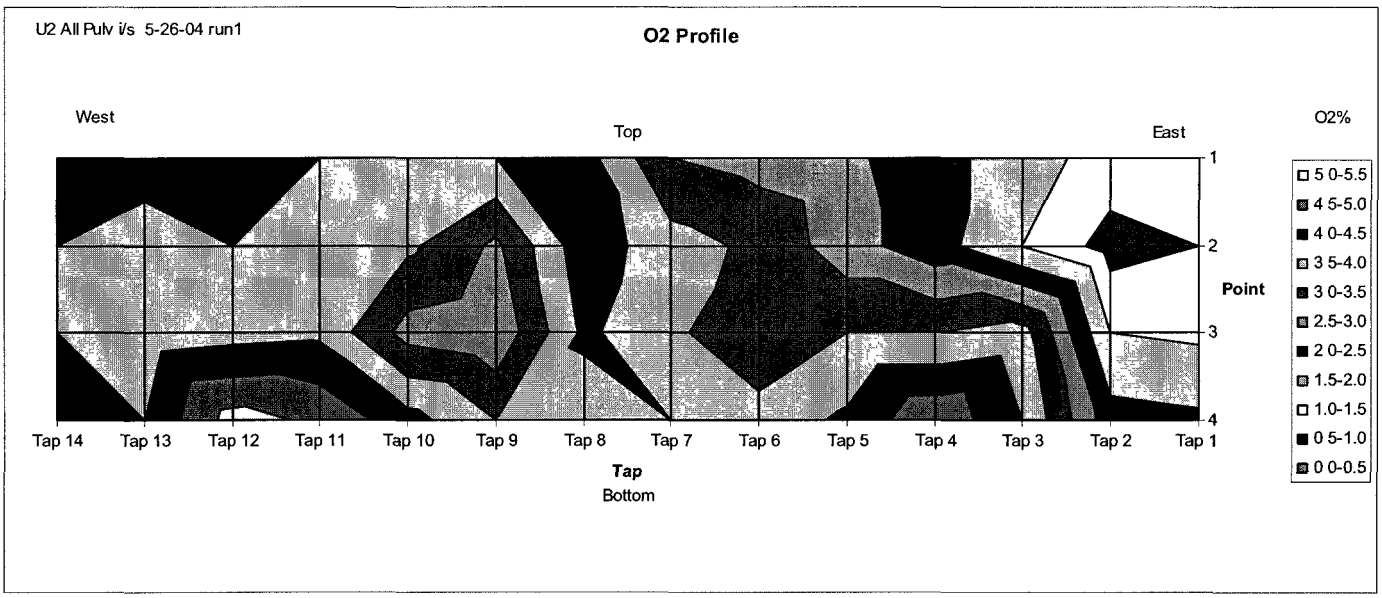


Fig 72 O2 Profile 2D

May 26th, Test 2:

Table 37 Burner Settings for Last profile and Current Profile

5/26/04	r16 Test1 Spin	A mill O/S Inner	Outer	5/26/04	r17 Test2 Spin	A mill O/S Inner	Outer
E1	3.75	1	8.0	E1	3.75	1.5	10.0
E2	3.75	1	6.5	E2	3.75	1.5	7.0
E3	4.25	1	6.0	E3	4.25	1.5	6.0
E4	4.5	1	6.0	E4	4.5	1.5	6.0
E5	3.75	1	6.5	E5	3.75	1.5	6.5
E6	4	1	10.0	E6	4	0.5	10.0
A1	3.75	1	8.6	A1	3.75	1.5	9.5
A2	3.75	1	6.8	A2	3.75	1.5	7.5
A3	4.25	1	6.1	A3	4.25	1.5	6.1
A4	4.25	1	6.3	A4	4.25	1.5	6.3
A5	3.75	1	7.1	A5	3.75	1.5	7.1
A6	4	1	10.0	A6	4	0.5	10.0
F1	4	1	9.0	F1	4	0.5	10.0
F2	3.75	1	6.0	F2	3.75	1.5	6.0
F3	4.25	1	7.0	F3	4.25	1.5	7.0
F4	4.25	1	7.0	F4	4.25	1.5	7.0
F5	3.75	1	6.0	F5	3.75	1.5	6.0
F6	4	1	10.0	F6	4	0.5	10.0
B1	5	1	14.0	B1	5	0.5	14.0
B2	3.75	1	9.0	B2	3.75	1.5	9.0
B3	3.75	1	9.0	B3	3.75	1.5	9.0
B4	3.75	1	9.0	B4	3.75	1.5	9.0
B5	3.75	1	9.0	B5	3.75	1.5	9.0
B6	4	1	14.0	B6	4	0.5	14.0
D1	3.75	1	9.0	D1	3.75	1.5	9.0
D2	3.5	1	5.5	D2	3.5	1.5	5.5
D3	3.5	1	4.5	D3	3.5	1.5	4.5
D4	3.75	1	4.5	D4	3.75	1.5	4.5
D5	3.75	1	5.5	D5	3.75	1.5	5.5
D6	5	1	10.3	**D6**	5	1.5	10.3
H1	3.75	1	9.7	H1	3.75	1.5	9.7
H2	3.75	1	7.0	H2	3.75	1.5	7.0
H3	3.75	1	6.0	H3	3.75	1.5	6.0
H4	3.75	1	6.0	H4	3.75	1.5	6.0
H5	3.75	1	7.0	H5	3.75	1.5	7.0
H6	3.75	1	9.5	H6	3.75	1.5	9.5
C1	3.75	1	10.0	C1	3.75	1.5	10.0
C2	3.75	1	7.5	C2	3.75	1.5	7.5
C3	3.75	1	7.0	C3	3.75	1.5	7.0
C4	3.75	1	7.0	C4	3.75	1.5	7.0
C5	5	1	7.5	C5	5	1.5	7.5
C6	5	1	10.0	C6	5	0.5	10.0
G1	4	1	12.6	G1	4	1	12.6
G2	3.75	1	9.0	G2	3.75	1.5	9.0
G3	3.75	1	8.9	G3	3.75	1.5	8.9
G4	3.75	1	11.5	G4	3.75	1.5	11.5
G5	4	1	12.5	G5	4	0.5	12.5
G6	4	1	14.0	G6	4	0.5	14.0

Table 38 CO Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	460.0	802.0	941.0	34.0	56.0	12.0	6.0	17.0	15 0	40.0	15.0	40 0	11.0	34.0
2	704.0	1218 0	345.0	36.0	12.0	50.0	1.0	37.0	113.0	7.0	14.0	24.0	7.0	8.0
3	480.0	466.0	105.0	5.0	5.0	62.0	36.0	111.0	139.0	94.0	22.0	12.0	23.0	17.0
4	289.0	255.0	102.0	0.0	3.0	15 0	1.0	64.0	82.0	176.0	115.0	37.0	120.0	19.0

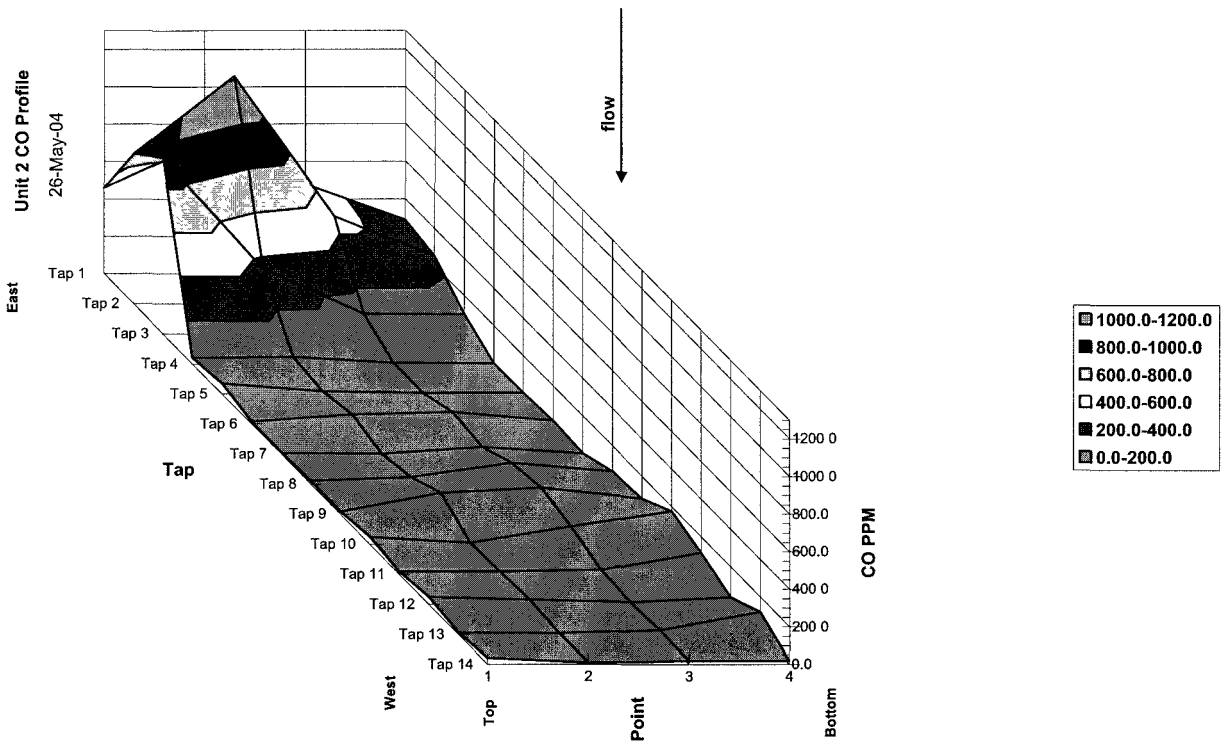


Fig 73 CO Profile 3D

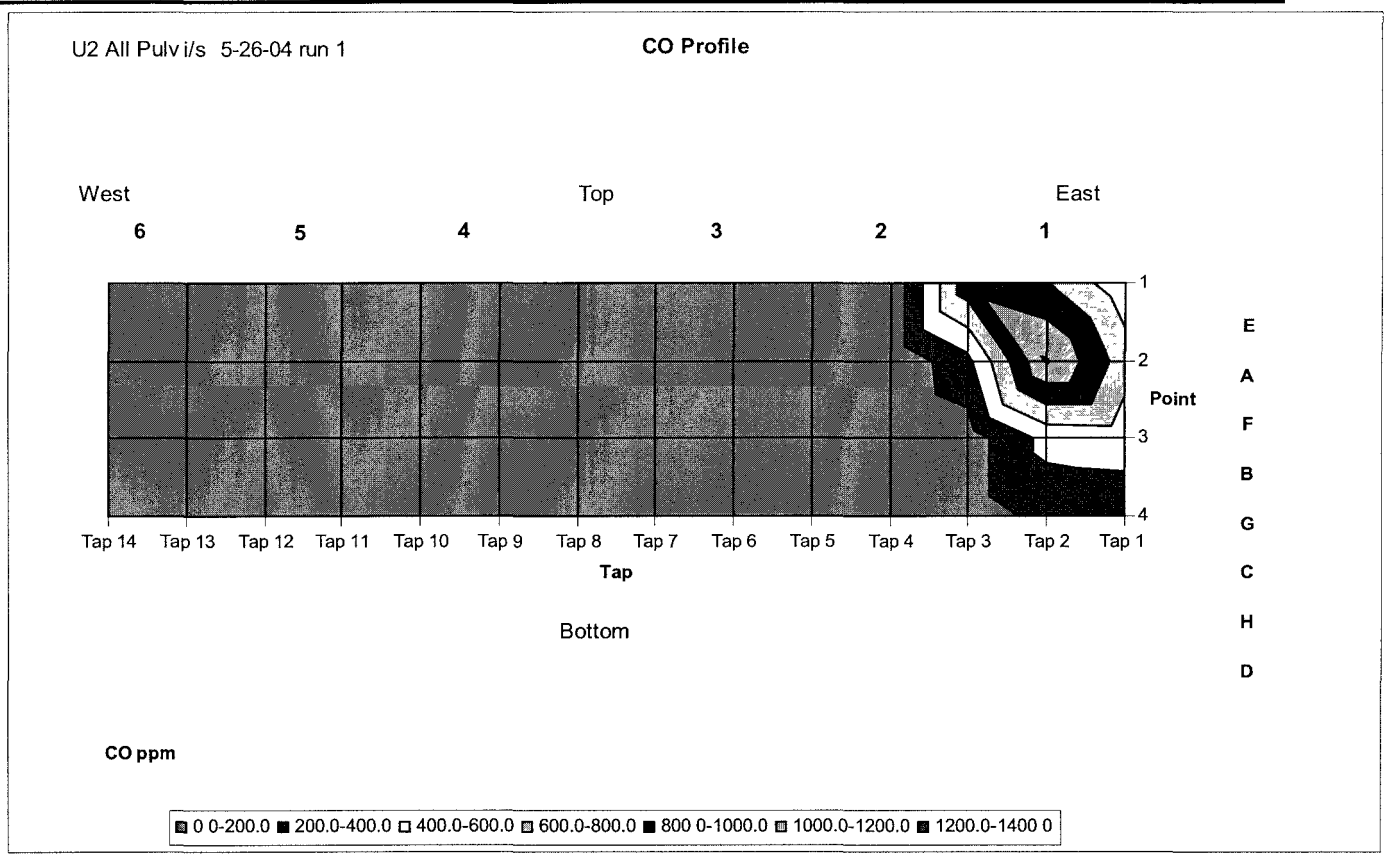


Fig 74 CO Profile 2D

Table 39 O2 Grid Readings

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	1.5	1.4	1.3	2.8	2.7	3.1	3.5	3.8	4.0	3.3	3.9	3.4	3.5	3.1
2	1.3	0.8	1.6	2.6	2.9	2.7	3.6	4.1	3.4	3.6	3.4	2.9	2.8	3.1
3	1.8	2.0	3.8	4.4	3.7	3.0	3.5	3.6	3.0	2.9	3.6	3.1	2.7	3.1
4	2.6	2.2	4.6	5.9	4.9	4.6	5.1	3.9	4.1	3.8	3.9	4.4	2.8	3.6

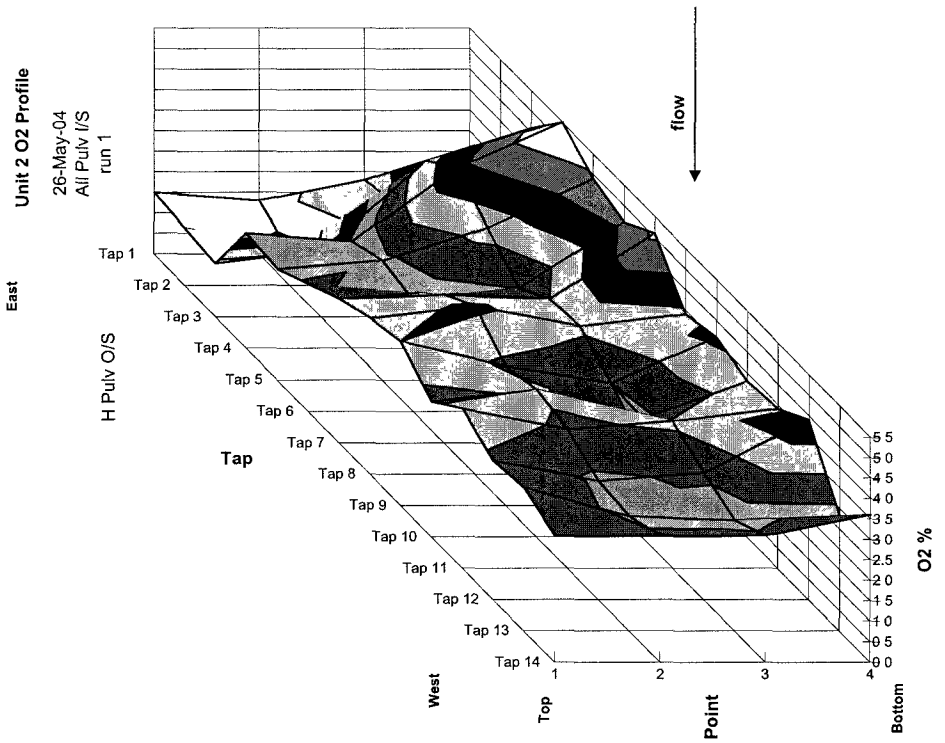


Fig 75 O2 Profile 3D

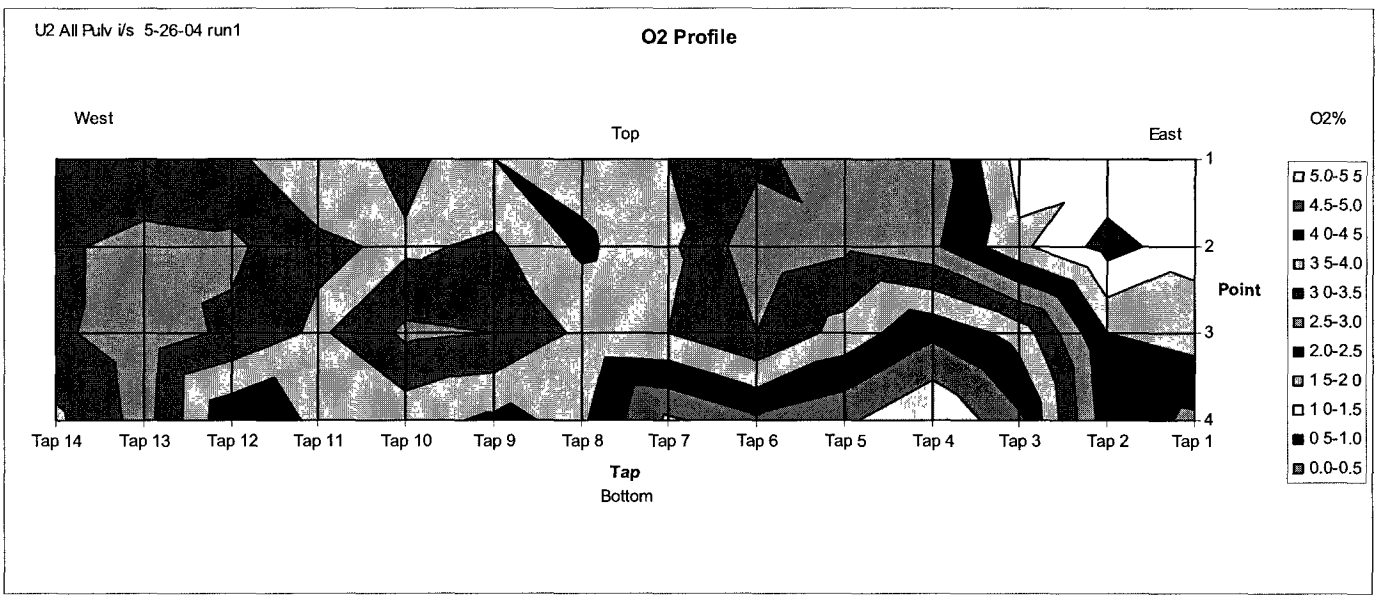


Fig 76 O2 Profile 2D

From: Howard Hamilton
To: Phil Hailes
Date: 2/11/2004 2:59:57 PM
Subject: Fwd: Update on Coal Valves 02/09/04

FYI

>>> Howard Hamilton 2/11/2004 2:57:33 PM >>>
Alan Dewsnup was able to get a detail drawing of the coal valve connection from B&W that should help clarify the coal valve work.

Jim, Alan and I meet with Alan on Monday (2/09/04) to give him a better idea of what is required by TEI concerning the installation of the coal valves after they have been removed.

Basic highlights of this meeting are as follows:

1. TEI is to place the coal valves so that Alan can inspect them on Monday Morning (02/09/04).

2. Alan will be inspecting the valve seat and the valve disk.

3. Alan will mark the valve seats and the valve disks that will need to be replaced on Monday (02/09/04).

4. Jim will see that the valve seats are wired to the coal valve so the Alan can easily view them.

5. There will be 96 valve seats on site for the outage so that all of the coal valves can have their valve seats replaced if required.

6. There are only 24 valve disks on site and if more are required to be replaced Maintenance will need to refurbish the work disks and get them back to TEI for placement.

7. Jim need only call Alan when he is ready for the gaskets, valve seats and valve disks required for this work. Alan will order them out of the Warehouse and have them placed on a pallet and delivered to TEI.

8. Alan will include several gallons of glue to assist in placing the gaskets.

9. Alan has stagged 30 gallons of Hi-Temp RTV also. This RTV is to be used to place the VFD for the ABT Burners. This material can be delivered at the same time that the coal valve materials are brought to TEI.

Note that the SIN's attached show that some of the gaskets have yet to arrive.

CC: Alan Dewsnup; James Nelson

ADVANCED BURNER TECHNOLOGIES
P.O Box 410, 271 Route 202/206
Pluckemin, NJ 07978
Phone: 908-470-0470, FAX: 908-470-0479
www.advancedburner.com

November 26, 2003

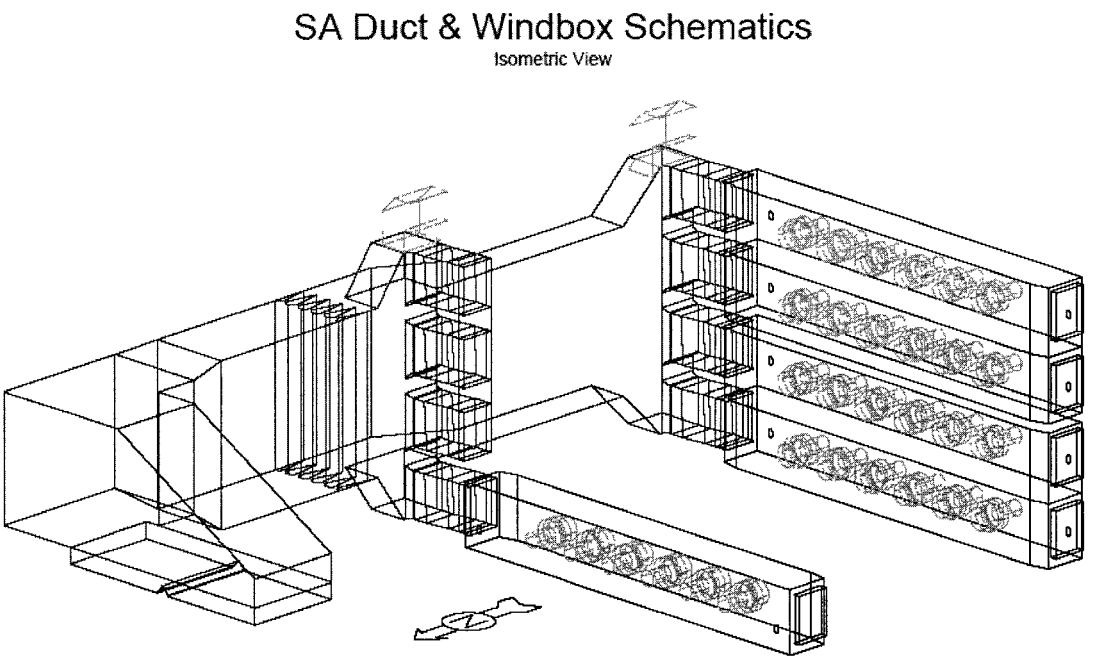
Intermountain Power Service Corporation
850 West Brush Wellman Road
Delta, Utah 84624

Attention: James Nelson

Reference: IPSC Contract 04-45606
Unit 2 Low NOx Burners
Flow Model Geometry of SA ducts, OFA ducts, and Windbox

Dear Mr. Nelson:

The flow model arrangement is shown in the following schematic. Only half of the unit is shown and the upper levels of rear wall windboxes were omitted for clarity.



In reviewing the flow model geometry for the secondary air ducts, overfire air ducts, and windboxes a few questions came to light:

1. The overfire air arrangement drawing, a section of which is shown below, does not show a sloping duct leading up to the rearwall overfire air duct. I sketched in a dashed line to show where the slope used to be. The OEM drawing of the secondary air duct arrangement (Ref. OEM drawing: 405864E) shows the slope and a narrower vertical extension. Was the slope removed and the vertical

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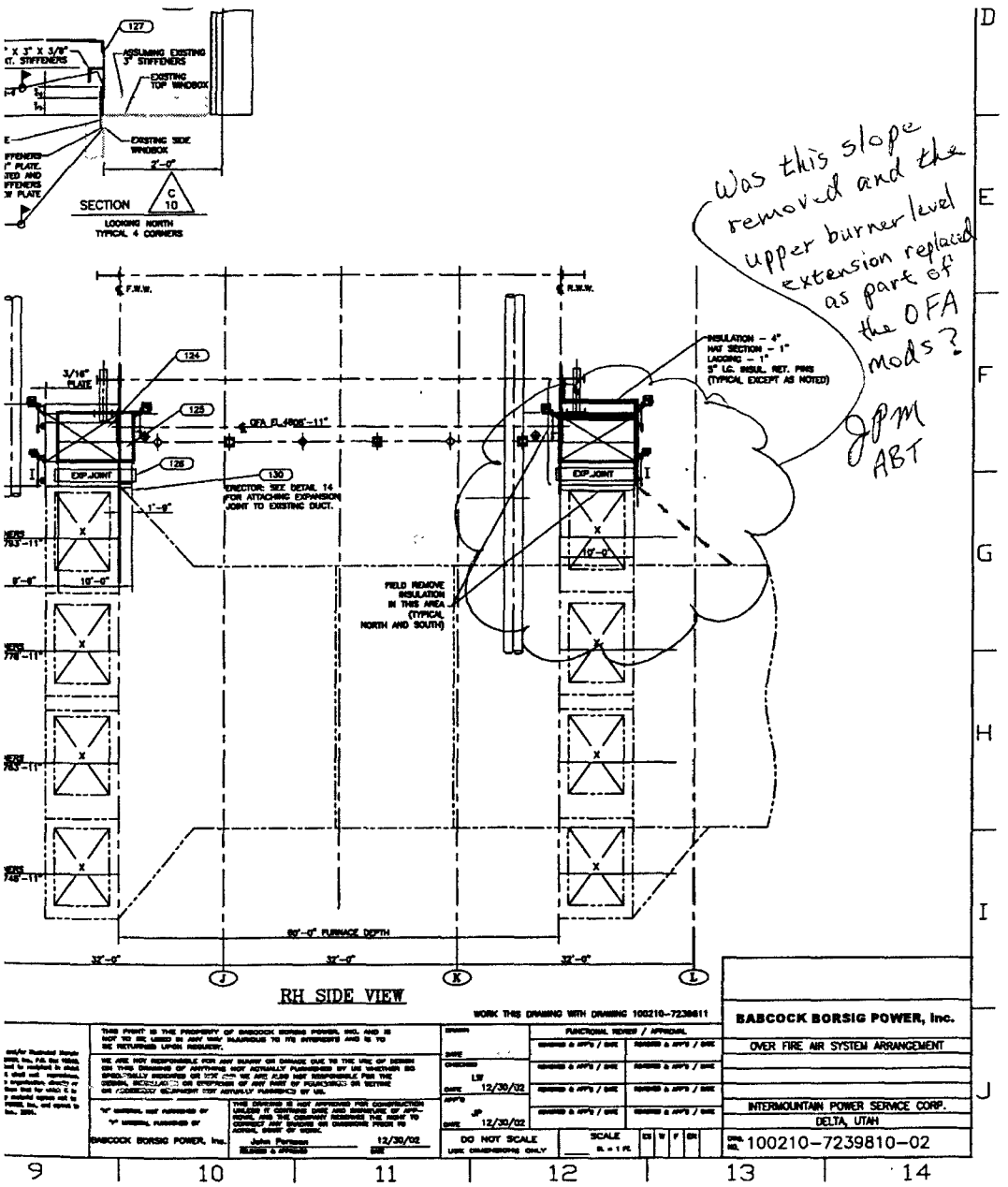
extension coming off the top of secondary air duct replaced as part of the overfire air modifications?



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2. The location of the windbox dampers was given in the OEM drawings but the details of the geometry and typical operating position were not. Some photos of the dampers indicated what appeared to be six blades per louver damper in an opposed blade arrangement. The model will be run with damper blades in the 30 degrees from horizontal position unless more accurate information is available. Please advise if this information is available?

3. There is a damper indicated in the secondary air duct 3'-6" downstream of column row 'N'. (Ref. OEM drawing: 406128E). Can information be provided regarding this damper? Particularly the number of blades, orientation, and typical operating position at full load.

Thank you for your assistance in this matter.

Sincerely yours,

Sal N. Ferrara
Director of Proposals & Projects

cc: Joseph Malone/Chuck Onaitis

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>
Date: 1/12/2004 1:55:26 PM
Subject: RE: Contract 04-45606, Burner Model

Howard/Phil,
The cost to shrink wrap the burner modules (to cover all openings on each end of the burner)would be a total of $18,700 for all 48 assemblies. Please advise by 1/14/04 should you wish to proceed with this change so we have sufficient time to order materials and install in time for the first shipments.
Regards,
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Wednesday, December 17, 2003 5:22 PM
To: sal@advancedburner.com; Phil Hailes
Cc: Gary Goold; James Nelson
Subject: Re: Contract 04-45606, Burner Model

Phil: Be advised that Steve Kozocowhich of ABT called me and requested to know how much of the burner we would like to see shrink wrapped. I advised him that we would want the areas of the burner wrapped that ABT would required to have the burners stored outside. I would image this would be mostly around the front plate of the burner where all of the instruments are to be located.

It would appear that ABT will want to charge us for this wrapping. If they send a quote to me I will make sure that you get a copy. If the price is right it should be implemented as it will give us the option of storing the burners outside, which could be very advantageous. Plus is would provide protection to the vulnerable areas of the burner during shipping and wherever they are stagged.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 12/17/2003 12:53:53 PM
>>>
Howard,

I received a message that you called and asked if we can provide
shrink
wrap on the burner. Which components would you like to see shrink
wrapped (knowing this I can obtain a fixed price from our fabricator
to
apply the shrink wrap accordingly).

Sal

CC: "'Gary Goold'" <GARY-G@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 3/3/2004 2:01:38 PM
Subject: RE: Contract 04-45606, Windbox Perforated Plates

Howard,

50 sheets, 40% open area, perf. plate shipped today via CCX (from 2 different locations due to large quantity). CCX phone is 800-755-2728, pro #'s 949854861 and 778967933.

I'm still working on the solid plate, stiffeners and drawings.

Regards,

Sal

-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Tuesday, March 02, 2004 4:34 PM
To: Howard Hamilton (howard-h@ipsc.com)
Cc: James Nelson; Phil Hailes; Tarkel Larson (tarkel@advancedburner.com)
Subject: Contract 04-45606, Windbox Perforated Plates

Howard,

Following perforated plate for installation in the burner windboxes, 4' x 10' sheets-11 gauge, have shipped from McNichols Co.:

27 sheets, 48% open area, from Chicago via CCX (800-755-2728), tracking no. 949854813

24 sheets, 60% open area, from LA via FED-X (800-463-3339), tracking no. 715131165

The rest of the perforated plate, 50 sheets, 40% open area, will be shipping tomorrow. I will provide you with the truck information then.

I am in the process of ordering the remaining material for installation in the burner windboxes (qty 12, 4' x 10' sheets-11 gauge plate and angles for stiffening). All windbox material is carbon steel. Drawings showing locations of plate are currently being finalized and I will forward them to you as soon as they are released to me.

Regards,

Sal

CC: "James Nelson" <JIM-N@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>, "Tarkel Larson" <tarkel@advancedburner.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'James Nelson'" <JIM-N@ipsc.com>, "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/20/2004 12:01:42 PM
Subject: RE: Donut for Lighters

James,
Your right, we should have told you what we were doing due to lack of information. We were on such a fast track to meet the delivery requirements, we missed communicating this to you.
The only other penetration through the burner front plate is the scanner hole. We provided a 3" NPT pipe nipple which is the requirement ABB gave us for connecting their scanner assembly. Please let me know if something is missing from ABB's supplied equipment.
Sal

-----Original Message-----
From: James Nelson [mailto:JIM-N@ipsc.com]
Sent: Friday, February 20, 2004 12:17 PM
To: sal@advancedburner.com; Howard Hamilton
Cc: tarkel@advancedburner.com; Phil Hailes; ssteede@teiservices.com
Subject: RE: Donut for Lighters

This may explain the ignitor hole size but why are the other penetrations so large? Also in the future we need to know the impact of any information you lack. We will always try our best respond if we understand the impact and the time frame.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/20/2004 8:49:15 AM >>>
Howard,
We requested early on in the project for information on the igniter OD (my 9/30/04 letter). Since we did not receive the information we made the hole larger than we thought the igniter could be so that all that would have to be done in the field was to install ring as you suggest. ABT should not have to supply the rings.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Wednesday, February 18, 2004 11:39 AM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Donut for Lighters

Please advise if ABT provides a donut to close the gap between the CFA Lighter and the front plate of the ABT burners.

Attached photos show a gap between the CFA Lighters and the hole provided to accept the lighter in the front plate of the ABT Burner.

The OD of the Outer Sleeve of the B&W lighter is 4.5" the diameter of the hole in the ABT Burner is 6".

IPSC has a couple of outer lighter sleeves in inventory and placed them
in the burner to get an idea of fit.

Note: Donut shown in photos was made up and placed to show what we think should have been provided by ABT.

CC: <tarkel@advancedburner.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Phil Hailes'" <Phil-H@ipsc.com>
Date: 12/23/2003 7:29:14 AM
Subject: RE: Elbow to Burner Gasket

Phil,
We will be supplying the gasket material and other hardware necessary to make the connections. This will be identified on our installation drawing as shipping items.
Sal

-----Original Message-----
From: Phil Hailes [mailto:Phil-H@ipsc.com]
Sent: Thursday, December 11, 2003 11:58 AM
To: sal@advancedburner.com
Subject: Elbow to Burner Gasket

Sal,

I'm just confirming that you intend on providing the necessary gasket material for the joint between the burner/coal pipe elbow and the ABT hardware. I assume that this is your intention.

Phil

CC: "Chuck Onaitis" <chuck@advancedburner.com>

From: Howard Hamilton
To: ssteede@teiservices.com
Date: 1/9/2004 6:26:31 PM
Subject: Coal Stop Valves

The attached photos show all of the part required to overhaul the Coal Stop Valve.

Alan Dewsnup (IPSC Planner) has order the required parts.

Bin numbers are shown where the items can be located except for the swing valve dish 13099, refernece photo for status of same.

Contact me when you are ready to order out these items.

This is Time and Material work. Please give me and cost not to exceed and I will start the paper work required for this extra work.

CC: Alan Dewsnup; James Nelson; Phil Hailes

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>
Date: 12/23/2003 8:08:05 AM
Subject: RE: 12-18-03 Telecon with Sal Farrara of ABT

Phil, or Howard,
Please let me know how you want the burners marked. There are only two different burner configurations (CW and CCW). To make it easier for the installation crew, Howard suggested that we just mark the burner front plate with "CW" and "CCW". However for your control system you may want to mark the burner numbers on the front plate as well according to information previously provided by Jerry Finlinson as follows:

FRONT SIDE = SOUTH

GROUP A				GROUP B		LVL
E1	E2	E3	E4	E5	E6	8
A1	A2	A3	A4	A5	A6	7
F1	F2	F3	F4	F5	F6	6
B1	B2	B3	B4	B5	B6	5

BACK SIDE = NORTH

GROUP A				GROUP B		LVL
D1	D2	D3	D4	D5	D6	8
H1	H2	H3	H4	H5	H6	7
F1	F2	F3	F4	F5	F6	6
G1	G2	G3	G4	G5	G6	5

Do you want us to put the burner numbers on in the shop, or will you do this in the field later? Please advise.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Monday, December 22, 2003 3:36 PM
To: Phil Hailes
Cc: sal@advancedburner.com; Jerry Finlinson; James Nelson; tsteed@teiservices.com
Subject: 12-18-03 Telecon with Sal Farrara of ABT

Called Sal on Thursday 12/18/03 and discussed the following:

1. Overall dimensions for the burners:

a. The overall shipping length of the burners will be 13'-6-1/2".

Note: This is from the front end of the burner to the end of the bracket support for the damper drive.

b. The overall width of the burner proper is 6'-6-3/8".

Note: This is the diameter of the back plate.

c. The overall shipping width of the burners will be 7'-10-3/4".

Note: This is the front support bracket for the burner. ABT will tack weld this to the chevron supports that weld to the burner proper. The bracket is used to stabilize the burner during shipping. It can be easily removed as it is only tack welded if required to assist in the rigging of the burner.

Note: because the dimension of the burners are large I called Tinker Steed at TEI and requested to know if he had considered rigging of such a large burner. Tinker advised that he had walked down a route and went over same with Phil Hailes. Tinker is confident that the burners to the rear wall can be rigged into position. Tinker feels that a fair amount of preparation will be required including rigging and steel removal and alterations.

I will get with Phil next week and walk down the proposed TEI route with him to get a better feel for the access path to the rear wall burners.

2. I asked Sal how many types of burners there would be.

a. Sal advised that there are two types of burners supplied for our project clockwise (CW) and counterclockwise (CCW).

b. Each Burner would be marked CW or CCW and would be required to fit into a position called out as CW or CCW on the ABT arrangement drawings.

c. I asked if the burners would each have their own specific identification number placed on the burners. Sal advised that he did not know for sure but that CW and CCW would probably be the only identification required to properly install the burners. Sal will get back to Howard if ABT will be providing separate marks or identification numbers for the burners.

Sal will provide clarification for identification numbers the week of 12/22/03.

3. I asked Sal how CW and CCW were determined.

a. Sal stated the direction of the spin of the fuel and air of the burner as seen from standing directly behind the back plate of the burner and looking toward the boiler interior was how CW and CCW were determined.

b. This would apply to both the front wall burners and the rear wall burners.

4. I asked Sal about ABT Support for this project.

a. A construction adviser is generally provided. He comes out just prior to demolition and works with setting the new burners. He is required for as long as it takes to work out any of the problems that may arise and the customer is satisfied with the burner placement.

b. A start-up adviser is brought on site just prior to bringing the unit back on line.

c. The Construction Adviser and the Start-up Adviser can be the same person or they can be two different people.

d. Sal advises that ABT has not decided who will be assigned these positions

Note: James Nelson advises that an ABT technician will be on site with the start of the outage (2/28/03) and will be on site thru completion of the start-up.

5. I asked Sal if it was possible to lift the burners up on there end if required to rigg into position.

a. Sal advised that two lugs could be welded almost anyplace on the 3/4" mild steel back plate to lift the burners.

b. Sal would advise against placing lugs on the front of the burners do to the potential damage to all of the items sticking out from the front plate (damper drives, spin vale controls, igniter sleeve etc.).

CC: "'Jerry Finlinson'" <Jerry-F@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, <tsteed@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Phil Hailes'" <Phil-H@ipsc.com>, <joel@advancedburner.com>, "'Howard Hamilton'" <howard-h@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>
Date: 1/19/2004 8:21:26 AM
Subject: RE: ABT Burner First Shipment Delayed

Phil,
The burner throat castings started arriving at PCW last Wednesday (qty 2)and PCW has received shipments Thursday (qty 2) and Friday (qty 3)as well. PCW is installing the castings on the burner registers as they arrive. I expect the first truckload (at least 3 burners, or 4 if truck size will allow) to ship this Thursday, 1/22. Starting next week we will ship an average of 3 truck loads per week. The last truckload is expected to leave the PCW shop by Friday, 2/20.
Regards,
Sal

-----Original Message-----
From: Phil Hailes [mailto:Phil-H@ipsc.com]
Sent: Saturday, January 10, 2004 3:19 PM
To: joel@advancedburner.com; sal@advancedburner.com; Howard Hamilton; James Nelson
Subject: ABT Burner First Shipment Delayed

Due to delays in the throat casting delivery, ABT will not be shipping a full truckload of burners until January 23. This will be a truck load of 4 or 5 burners.

I've asked ABT to ship a single burner, if the full shipment date slips beyond this point. The single burner would give us an opportunity to move a burner through the unit and position it. A practice run, so to speak.

ABT and the shop (PCW) is aware that we can not allow the final on-site date of Feb 23 to slip, because of outage concerns.

Because of this delay, in order to reach the final deadline, the weekly burner delivery will have to increase to about 15 burners.

Sal, will you please confirm the delivery schedule, as we discussed, for the burners and throat castings?

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 11/5/2003 8:11:45 AM
Subject: Re: ABT Burner Info Status

Thank you Phil. I received both emails with drawings. I appreciate your help in expediting payment of the first 2 invoices.
regards,
Sal
----- Original Message -----
From: "Phil Hailes" <Phil-H@ipsc.com>
To: <sal@advancedburner.com>
Cc: "James Nelson" <JIM-N@ipsc.com>
Sent: Tuesday, November 04, 2003 6:01 PM
Subject: ABT Burner Info Status

> Sal,
>
> 1) I will be sending in a separate email the drawings of the windbox
> and SA duct that you've requested. There's quite a number of them, but
> I've spent that last two days going through the files to get appropriate
> ones. Let me know if you need additional drawings.
>
> 2) I've submitted the paper work for the A03008-2 invoice to be paid.
> You should be getting the check soon.
>
> 3) You will be receiving the formal notice, via contract addendum, of
> our intent to use Air Monitor for the instrumentation work.
>
>
> Phil
>
>
>
>
>

CC: "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Jerry Finlinson'" <Jerry-F@ipsc.com>
Date: 2/27/2004 9:57:18 AM
Subject: RE: ABT burner thermocouple installation difficulties

Jerry,
I ordered 96 replacement thermocouples. They will be 1/16" diameter, simplex type, as shown on attached sketch 10-4881. The shop made a mockup of the tube run and tried a 1/8" diameter thermocouple and it was still very difficult to insert. The 1/16 diameter type inserts easily. We have to go to compression type (spring loaded type doesn't come in 1/16" diameter). The compression fitting will provide adjustability to insure the tip is inserted fully and bottoms out at end of tube. Delivery is being expedited however material takes 2 weeks to acquire. The promised delivery is four weeks (by 4/2/04).
Regards,
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, February 25, 2004 9:57 AM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: ABT burner thermocouple installation difficulties

Sal,
I had my I&C supervisors go out with me to attempt to put the thermocouples into the wells.
With much struggle and grabbing them with pliers we were able to get the short one in.
We are nervous about damaging the thermocouple sheath.

We also got a 1/8 inch diameter copper rod and inserted it in, it went easier, but was still twisted
up. You should specify that the bend radius should not be less that 10 to 12 inches. In the case of the short
thermocouple is a bend even necessary? Couldn't the thermowell just be angled down to the spot where it is welded on?

We think at this point that it would be best to switch all the thermocouples to 1/8 inch diameter.
Can that be done in the time frame? You can have your guy take a look at it when he is here tomorrow.

We are worried that it's such a struggle to get the 3/16 diameter ones in the pipe that it will
be nearly impossible to get them out again. We also don't want to use organic lubricant because
it will carbonize in service and make it difficult to reinstall another thermocouple.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/23/2004 3:02:08 PM
>>>

Jerry,
Per my discussion with the PCW fab shop, tubes were bent with 4" centerline radius die. In discussion with the thermocouple supplier, the
.312" tube ID with 4" radius bends is sufficient for the .187" diameter
thermocouple to pass thru. Our experience with the TC's is they are pretty flexible however they don't just slide in. It takes a little effort to work the TC through the tube but our experience is that they will work through. Twisting, by holding onto the 3/16 sheath at the same
time you're pushing in normally helps (just be careful not to twist the
head portion of the TC assembly).
Let me know how this works.
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, February 20, 2004 3:51 PM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; Jim Knapp; James Nelson; John Fritzges; Phil Hailes
Subject: ABT burner thermocouple installation difficulties

FYI,
Yesterday, I took one of the thermocouples out and tried sliding it down the thermowells that are installed in the burner.
It would only slide in about 13 inches before hitting a tight bend in the thermowell. Apparently your installers are making some sharp corner
bends on the thermowell that's making it very difficult to insert.

Have you tried inserting one?
The type E thermocouples that we have are 3/16 inch diameter and don't bend so easy.

Maybe we'll need to get some 1/8 inch diameter thermocouples.

I noticed that there are some sharp bends on the thermocouiple out near
the tip as well.

The bends are only 10 to 15 degrees, but they have a sharp corner, it would have been better to make it very gradual, then the thermocouple would slide in easily.

Please advise on your recommended solution.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

CC: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Howard Scott'" <HOWARD-S@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'John Fritzges'" <JOHN-F@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, "Tarkel Larson" <tarkel@advancedburner.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 1/2/2004 5:03:05 PM
Subject: Re: Burner Gaskets

Howard,
ABT will be providing the gasket and fasteners between the existing IPSC 90 degree elbow and burner pup (spool piece) that includes the ABT flow distribution device.
regards,
Sal
----- Original Message -----
From: "Howard Hamilton" <howard-h@ipsc.com>
To: <sal@advancedburner.com>
Cc: <TDraper@centry.net>; "Jerry Finlinson" <Jerry-F@ipsc.com>; "James Nelson" <JIM-N@ipsc.com>; "Phil Hailes" <Phil-H@ipsc.com>; <tsteede@teiservices.com>
Sent: Wednesday, December 31, 2003 3:57 PM
Subject: Burner Gaskets

> Will ABT be providing the gasket and fasteners between the existing IPSC
> 90 degree elbow and burner pup that includes the ABT flow distribution
> device which are being fabricated by an ABT vendor and being sent
> separate from the burners.
>
> If not please advise the gasket and fastener hardware required to make
> this connection. Reference drawing 03008-100-A00-D0 (Sections A-A and
> B-B).
>
>
>
>
>
>
>
>

CC: <TDraper@centry.net>, "Jerry Finlinson" <Jerry-F@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>, <tsteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/5/2004 10:14:50 AM
Subject: RE: Burner Throat Welding

Howard,
It is not necessary to fully weld-out the throat casting segments. Stitch welding was indicated on our detail drawings given to the casting foundry, however they decided to fully weld the first set of throat assemblies. When we received the first set of throat castings at the burner assembly shop, we reminded the foundry that full welding was not required and instructed them to stitch weld them as we initially instructed. Either way, the full weld and stitch weld assemblies, are acceptable to us.
Please let me know if you have other questions.
Regards,
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Wednesday, February 04, 2004 1:52 PM
To: sal@advancedburner.com
Cc: Jerry Finlinson; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Burner Throat Welding

Sal: Please review and advise.

The burner throats are being sent out stitch welded and fully welded along the joint of the burner throat. Listed below are the burners in question and attached photos are sent along to help clarify the situation.

Joints Fully Welded and Ground Smooth on The Following Burners:

CW2,1,11,12,4,5, and 9

Joints Stitch Welded on The Following Burners:

CW4,10,13,15,16, and 6

Joint Fully Welded and Not Ground Smooth on The Following Burner:

CW14.

CC: "'Jerry Finlinson'" <Jerry-F@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>, "Chuck Onaitis" <chuck@advancedburner.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/13/2004 8:22:50 AM
Subject: Request of Services & Insurance

Howard,
We will provide a new certificate upon renewal of our insurance in April.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Thursday, February 12, 2004 3:52 PM
To: tarkel@advancedburner.com
Cc: sal@advancedburner.com; James Nelson; Phil Hailes; Sylvan Lovell; ssteede@teiservices.com
Subject: Request of Services

Request that you be on site Thursday morning, February 26th, 2004.

TEI is looking to start installing ABT Burners on Tuesday, March 2.

TEI will be working 24 hours a day 7 days a week, two 12 hour shifts 6:30 AM to 6:30 PM, beginning Friday night, February 27th.

Insurance: I checked with Jan Finlinson our risk manager and was advised that ABT is good on their insurance until the middle of April.

Note: Your may want to look at extending this coverage.

Drug Policy: Because you are a Service Representative by yourself and not using tools IPSC is willing to wave on ABT having a drug policy.

Safety Orientation: When you arrive on Thursday morning, February 26th you will be taken to our Safety Department. You will be given IPSC's General Safety Review, confined space class and tagging class. Respirator training will be required if you will be wearing a respirator mask.

You will need to be signed on several clearance once Unit 2 is down. TEI be holding the group sheets for these clearances.

CC: "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, "'Sylvan Lovell'" <SYLVAN-L@ipsc.com>, <ssteede@teiservices.com>, "Tarkel Larson" <tarkel@advancedburner.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/11/2004 11:06:14 AM
Subject: RE: Questions and requests Concerning Vertical Fuel Distributor(VFD)

Howard,
See my responses below.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Tuesday, February 10, 2004 4:10 PM
To: sal@advancedburner.com
Cc: James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: RE: Questions and requests Concerning Vertical FuelDistributor(VFD)

1. Is the holder made out of hi carbon or low carbon steel. This will have and effect on the welding procedure.
Response: A36, medium carbon.

2. Drawing 3008-500-A00-0 was help. Could you send 3008-500-A01-0, 3008-500-A00-D01, 3008-500-A00-D02
Response: These are shop fabrication details that we don't supply to customers. However attached is the -A01 drawing you asked for that gives the steel shell dimensions that should help you.

3. When we last talk back in mid January the VFD and HFD were scheduled to be on site 2/23/04. You were going to see if this schedule could be improved. What is that latest ETA for the VFD , HFD and related hardware.
Response: Materials and fabrication is on going - kits, cement, VFD, HFD look to be on schedule for delivery on 2/23 but I don't expect they'll to be on site any sooner.

4. The ceramic block is note below as 1" thick and 9" long. How wide is it?
Response: The tiles have a major width of 2.578" (this with is the back of the tile and sets against the ID of the coal elbow). The tiles have a side angle of 6 deg 26 minutes- this provides the key-arch.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/10/2004 9:18:15 AM
>>>

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Monday, January 26, 2004 2:11 PM
To: sal@advancedburner.com
Cc: James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Questions and requests Concerning Vertical Fuel Distributor(VFD)

Reference Drawing 03008-500-A03-D0 entitled, "Installation of VFD":

1. To get a better feel for the dimension of the VFD would you email a copy of the drawing for piece 03008-500-A00-0 called out on 03008-A03-D0.

Response:See attached drawing.

2. What material is the VFD made of?

Response:Silicon Carbide Block with Carbon steel holder on outside.

3. What is the P-number and ASME designation for the material the VFD is made out of?

Response:see previous answer

4. The coal piping elbow is made of carbon steel (P1). Drawing 03008-500-A03-D0 calls for a 3/16" fillet 1" on 4" stitch weld on all sides of the VFT.

What is the type of welding rod required and is post or preheat required?

Response:This is installation contractors responsibility.

5. Drawing 03008-500-A03-D0 states, "Remove existing ceramic lining in these areas only and replace with new ceramic liner kits supplied by ABT."

Does the ceramic from the entire first and second inlet segments of the
miter elbow need to be removed?

Response:Enough ceramic material needs to be removed to fit the insert.
We don't have detail dimensions of existing ceramic liners.

What is the size and shape of the ceramic to be placed back?

Response:1" thick, standard 9" long ceramic tile with 6 degree angle bevel for self supporting key arch attachment.

Are there just two new pieces of ceramic that fit back into the piped segments and around the VFT?

Response:Pieces will need to be cut to fit depending on size tile liners
removed. We will supply you with four 10" continuous rim diamond impregnated masonry blades for cutting the replacement ceramic tiles.

Are there a bunch of small pieces like floor tiles that need to be placed back?

Response:See response on size above.

Does the ceramic liner kit have an instruction sheet that you can email
or fax?

Response:I will obtain instruction sheet and forward it to you.

Has ABT used these kits on past projects?

Response:Yes.

Does ABT know how many man-hours have been expended to install the kits
we have been supplied?

Response:No, this has always been performed by a sub-supplier at a fixed
price.

5. Drawing 03008-500-A03-D0 states, "Use high temperature cement as bedding and grout". Supplied by ABT"

Would ABT email or fax an MSDS for this high temperature cement?

Response:I will obtain MSDS sheet and forward to you. Note that any RTV
required should be supplied by the installation contractor.

What is the differentiation between grout and bedding?

Response: Bedding is set that the tile sits in. Grout is applied in tile
seams. This application does not require grout.

CC: "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Phil Hailes" <Phil-H@ipsc.com>
Date: 10/13/2003 4:43:23 PM
Subject: Re: RMA 253 vs 309 SS, IPSC Contract 04-45606, Unit 2 Low NOxBurners

Phil,
The additional cost is due solely to the price difference between 309 plate and 253 MA plate materials. Components that would change to 253 MA are those shown as 309 SS on the drawing C. Onaitis emailed to you on 9/29/03 (drawing A03008-11). These include the outer adjustable spins vanes, flow divider, and outer register throat cones.

We always use 309 for these components due to its high heat resistance. We have never used 253 MA on our burners in the past. We only investigated using 253 MA recently as a result of your question on whether or not we would be open to using other materials in fabrication of our burners. Based on published information by the 253 MA supplier, we believe it is a good substitution for 309 SS. Also based on your own experience, 253 MA may in fact out perform 309 SS at constant elevated temperatures.

I trust this is a satisfactory answer, however please let me know if you have other questions.
regards,
Sal
----- Original Message -----
From: "Phil Hailes" <Phil-H@ipsc.com>
To: <sal@advancedburner.com>
Cc: "James Nelson" <JIM-N@ipsc.com>
Sent: Monday, October 13, 2003 5:45 PM
Subject: RMA 253 vs 309 SS, IPSC Contract 04-45606, Unit 2 Low NOxBurners

> Sal,
>
> Is this additional cost solely material cost of the 253 MA? It appears
> that 309/253 would be used on the outer and inner registers, as well as
> the outer adjustable spin vanes. Correct?
>
> What is your reasoning for using the 309 rather than the 253? Have you
> ever considered or used the 253 in any burners?
>
> >>> "Sal Ferrara" <sal@advancedburner.com> 10/13/2003 7:05:22 AM >>>
> Phil,
> We looked into the cost associated with substituting the 309 S.S.
> portions of our burner registers with 253 MA material. The 253 MA is
> more expensive than 309 S.S. and the total additional cost per burner
> assembly would be $ 850 (a total of $ 40,800 for all 48 burners).
> Please let me know if whether or not you are interested in implementing
> this material change. We are starting to purchase the materials for
> fabrication so I would like a decision by this Friday, 10/17/03, or let
> me know if you have any questions.
> regards,
> Sal
>

CC: "Chuck Onaitis" <chuck@advancedburner.com>, "joel vatsky" <joel@advancedburner.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Pam Snyder'" <PAM-S@ipsc.com>
Date: 3/9/2004 1:54:18 PM
Subject: RE: Shipping Status of ABT Material 03/09/09

Howard,
The angle and solid plate for the windbox baffling will most likely ship tomorrow on dedicated truck from PCW (we're trying to locate a tandem team truck however if we are unsuccessful, it won't arrive in Delta until Monday 3/15). I'll send you the paper work tomorrow when the load is picked up.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Tuesday, March 09, 2004 2:38 PM
To: Pam Snyder
Cc: sal@advancedburner.com; tarkel@advancedburner.com; Gary Goold; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Shipping Status of ABT Material 03/09/09

The following is the shipping status of perforated plate and HFDs from ABT.

1. 27 sheets of 4' x 8' 11 GA, perforated steel plate 48% open - shipped from Chicago via CCX tracking PRO no. 949854813.

Presently: Received 3/5/04

2. 24 sheets of 4' x 10' 11 GA, perforated steel plate 60% open - shipped from LA via Fedex PRO no. 715131165.

Presently: Received 3/5/04

3. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped from Latrobe, PA via ABF Freight, Pro no. 310215649

Presently: Received 3/9/04

4. 12 Horizontal Fuel Diffusers, weighing 7200 lbs. shipped from Latrobe, PA via ABF Freight, Pro no. 310214050.

Presently: Received 3/05/04

5. 50 sheets of 4' x 10' x 11 GA. perforated steel plate 40 % open -shipped from Chicago via CCX tracking PRO no. 949854861 and 779854961, wt 3600 lbs

Presently: Received 3/5/04

6. 4 Horizontal Fuel Diffusers, weighing 2600 lbs - shipped from Latrope, PA via ABF Freight, Pro no. 310216153.

Presently: Received 3/8/04

7. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped form Latrope, PA Via ABF Freight, Pro no. 310214052

Presently: Shipment is in Salt Lake City.

8. 10 Horizontal Fuel Diffusers, weighing 6200 lbs - shipped from Latrope, PA Via ABF Freight, Pro no. 310216164.

Presently: To arrive in Omaha, Nebraska at 23:47 today.

Sal: Where is the angle and solid plate for the windbox baffling.

CC: <tarkel@advancedburner.com>, "'Gary Goold'" <GARY-G@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Pam Snyder'" <PAM-S@ipsc.com>
Date: 3/11/2004 7:41:54 AM
Subject: RE: Shipping Status of ABT Material 3/10/04

Howard,
See attached shipping papers for pickups made at PCW and JMS yesterday. Pacer picked up the PCW load (phone no. is 412-343-9909). Mercer Transport picked up the HFD's from JMS. Joe Torrero advised that he gave the driver's cell phone number to James Nelson this morning. The HFD's will arrive in Delta this Friday or Saturday. The channel and plate should arrive this Monday.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Wednesday, March 10, 2004 11:59 AM
To: Pam Snyder
Cc: sal@advancedburner.com; tarkel@advancedburner.com; Gary Goold; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Shipping Status of ABT Material 3/10/04

The following is the shipping status of perforated plate and HFDs from ABT.

1. 27 sheets of 4' x 8' 11 GA, perforated steel plate 48% open - shipped from Chicago via CCX tracking PRO no. 949854813.

Presently: Received 3/5/04

2. 24 sheets of 4' x 10' 11 GA, perforated steel plate 60% open - shipped from LA via Fedex PRO no. 715131165.

Presently: Received 3/5/04

3. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped from Latrope, PA via ABF Freight, Pro no. 310215649

Presently: Received 3/9/04

4. 12 Horizontal Fuel Diffusers, weighing 7200 lbs. shipped from Latrope, PA via ABF Freight, Pro no. 310214050.

Presently: Received 3/05/04

5. 50 sheets of 4' x 10' x 11 GA. perforated steel plate 40 % open -shipped from Chicago via CCX tracking PRO no. 949854861 and 779854961, wt 3600 lbs

Presently: Received 3/5/04

6. 4 Horizontal Fuel Diffusers, weighing 2600 lbs - shipped from Latrope, PA via ABF Freight, Pro no. 310216153.

Presently: Received 3/8/04

7. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped form Latrope, PA Via ABF Freight, Pro no. 310214052

Presently: Loaded on UTAW today at

8. 10 Horizontal Fuel Diffusers, weighing 6200 lbs - shipped from Latrope, PA Via ABF Freight, Pro no. 310216164.

Presently: To arrive in Cheyenne, Wyoming today at 14:45

,

Sal:

What is the PRO # for the angle and plate.

How is next shipment of HFDs being sent and who do we contact for shipping status.

CC: <tarkel@advancedburner.com>, "'Gary Goold'" <GARY-G@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Pam Snyder'" <PAM-S@ipsc.com>
Date: 3/11/2004 11:59:53 AM
Subject: RE: Subject: Shipping Status of ABT Material 3/11/04

Howard,
The remaining 10 HFD's are expected to complete tomorrow and trucking is currently being arranged for pickup. I will let you know the trucking details once finalized and pick up complete.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Thursday, March 11, 2004 12:55 PM
To: Pam Snyder
Cc: sal@advancedburner.com; tarkel@advancedburner.com; Gary Goold; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Subject: Shipping Status of ABT Material 3/11/04

The following is the shipping status of perforated plate and HFDs from ABT.

1. 27 sheets of 4' x 8' 11 GA, perforated steel plate 48% open - shipped from Chicago via CCX tracking PRO no. 949854813.

Presently: Received 3/5/04

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Presently: Received 3/5/04

3. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped from Latrope, PA via ABF Freight, Pro no. 310215649

Presently: Received 3/9/04

4. 12 Horizontal Fuel Diffusers, weighing 7200 lbs. shipped from Latrope, PA via ABF Freight, Pro no. 310214050.

Presently: Received 3/05/04

5. 50 sheets of 4' x 10' x 11 GA. perforated steel plate 40 % open -shipped from Chicago via CCX tracking PRO no. 949854861 and 779854961,
wt 3600 lbs

Presently: Received 3/5/04

6. 4 Horizontal Fuel Diffusers, weighing 2600 lbs - shipped from Latrope, PA via ABF Freight, Pro no. 310216153.

Presently: Received 3/8/04

7. 2 Horizontal Fuel Diffusers, weighing 1300 lbs - shipped form Latrope, PA Via ABF Freight, Pro no. 310214052

Presently: Loaded on UTAW today at

8. 10 Horizontal Fuel Diffusers, weighing 6200 lbs - shipped from Latrope, PA Via ABF Freight, Pro no. 310216164.

Presently: Shipment is on a Utah and Wyoming truck.

9. 8 Horizontal Fuel Diffusers, weighing 6000 lbs - shipped from Latrope , PA via Mercer Transportation.

Presently: Shipment is in St Louis, Missouri

Note: Drivers Randy and Donna Ridel can be contacted at 412-855-0228 or 412-289-9662. They figure to be in Utah on Friday (3/12/04)

10. 12 - 4'x10' sheets of 11 GA plate, 105 - 3" channel x 6.7 lb/ft x 40' and 13 - 6" channel x 6.7 lb/ft shipped out from Passaic County Welders via Pacer Transportation. This is a single driver and not a tag team truck. Truck should be on site Monday (3/15/04).

Presently: Load was picked up on Wednesday Afternoon 3/10/04.

Sal: We have 20 HFDs on site, 18 are on trucks this is a total of 38. What it the status on the remaining 10 HFDs?

CC: <tarkel@advancedburner.com>, "'Gary Goold'" <GARY-G@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>, "'Pam Snyder'" <PAM-S@ipsc.com>
Date: 3/2/2004 11:41:43 AM
Subject: RE: HFDs (Horizontal Fuel Deflectors)

Howard,
I just realized this morning that an express delivery wasn't requested and delivery would have been next Monday. I then had JMS get in touch with ABF and change the status to express, hence the truck change in Ohio. The remaining shipments will be express delivery.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Tuesday, March 02, 2004 12:42 PM
To: Pam Snyder
Cc: sal@advancedburner.com; tarkel@advancedburner.com; Gary Goold; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: HFDs (Horizontal Fuel Deflectors)

ABT is shipping the 48 fuel deflectors we need for the Unit 2 Burners via ABF Freight Company on 12 Pallets.

ABFs PRO# is 310214050.

ABF tracking shows that 12 pallets were shipped on Monday March 1st with an ETA of Friday, March 5th.

Presently our shipment is in Daytona, Ohio being unloaded.

Sal: As important as this shipment is why was in not sent direct on a dedicated truck. Having to load and unload the shipment will cost days in time.

Pam: As soon as this shipment hits Post 3 have the guard call me.
Thanks.

CC: <tarkel@advancedburner.com>, "'Gary Goold'" <GARY-G@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 3/9/2004 7:23:41 AM
Subject: RE: HFDs and Perforated Plate Shipments

Howard,
See attached shipping documents. ABF guaranteed delivery by 5 pm on Friday, 3/12.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Monday, March 08, 2004 7:46 PM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com; James Nelson; Phil Hailes
Subject: RE: HFDs and Perforated Plate Shipments

What is the PRO# for this shippment?

>>> "Salvatore Ferrara" <sal@advancedburner.com> 3/8/2004 8:44:02 AM
>>>
Howard,
10 more HFD's will be complete by the end of the day. (I'll forward you
the tracking info when the load is picked up later this afternoon). Out the remaining 18, metal fabrication is complete and tiles are being
cut for all with 8 in process of being lined. We will continue to ship each day (4-5 assemblies/day) as they complete. The JMS shop is committed to complete by this Friday 3/12 and based on progress this past weekend, I believe they can do it. I'll keep you posted on progress
each day.
Sal
-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Monday, March 08, 2004 9:01 AM
To: 'Howard Hamilton'
Cc: 'tarkel@advancedburner.com'; James Nelson; Phil Hailes
Subject: RE: HFDs and Perforated Plate Shipments

Howard,
2 HFD's were picked up Friday evening at JMS. See attached shipping documents. As of Friday a total of 20 HFD's have shipped. I'll let you know later today on schedule for completion of the remaining 28.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Friday, March 05, 2004 12:23 PM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com
Subject: HFDs and Perforated Plate Shipments

Where there anymore shipment of HFDs and Perf Plated yesterday.

CC: <tarkel@advancedburner.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Jerry Finlinson'" <Jerry-F@ipsc.com>
Date: 1/14/2004 8:54:13 AM
Subject: RE: IPP Burner TC's Type E

Jerry,
Last week I handed Phil Hailes 2 copies of Thermocouple drawing 10-4787Rev1. Let me know if you still have questions.
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, December 18, 2003 1:35 PM
To: sal@advancedburner.com
Cc: Howard Hamilton; James Nelson; Phil Hailes
Subject: RE: IPP Burner TC's Type E

Sal,
That sounds like a pretty good system.
Our current ones are tack welded onto the burner, then a 1/4 inch thermocouple wire is
fed back out to a small jbx. I have enclosed some photos.

Could you send me the manufacturer and part number of the ones you are planning to
supply? Do you have any photos or diagrams of the mounting?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 12/18/2003 11:15:31 AM
>>>
Jerry,
To install the TC in the field is easy since it would be slid into the shop installed guide pipes. The end of the guide pipes are shop welded to the tip and barrel so you wouldn't have to do this in the field (field connections will required screwing into place). I will proceed with change to Type E.

I estimate the cost to add an additional thermocouple, guide pipe assembly to be $450 per burner. The am concerned however the impact this
will have on delivery if we make any changes at this point in the shop fabrication of the burner assemblies.
Sal

-----Original Message-----

From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Thursday, December 18, 2003 10:50 AM
To: sal@advancedburner.com
Subject: RE: IPP Burner TC's Type E

We'd like to stick with type E. What is the difficulty of field mounting?
Are the locations readily accessible? Are they tack welded onto metal?
I was wondering how much the TC's cost. If we wanted to have a 3rd TC mounted on the backplate to allow comparison with our current burner backplate
temps, how much would that cost us?
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 12/18/2003 7:39:22 AM >>>
Jerry,
I stopped production on the probes until you make your decision. At this
point there would not be any impact on price to make the change to Type
E however delivery of TC's will be delayed until at least 1st week of February. In this case the thermocouples will need to be installed on site at IPP. Based on this, please let me know ASAP which way you want to go (TYPE E or Type K).

-----Original Message-----
From: Salvatore Ferrara [mailto:sal@advancedburner.com]
Sent: Thursday, December 18, 2003 9:00 AM
To: 'Jerry Finlinson'
Cc: 'Bill Morgan'; 'Jim Knapp'; 'James Nelson'; 'Phil Hailes'
Subject: RE: IPP Burner TC's Type E

Jerry,
We ordered Type K thermocouples. I'll check on changing it and what the
overall impact will be on price and delivery. This will definitely impact delivery date of the first burner assemblies scheduled to complete the first week of January.
The thermocouple location in the burner front are shown on arrangement drawing 03008-100-A00-DO (Items G1 & G2). G1 measures the fuel injector
tip (coal nozzle) temperature and G2 measures the fuel injector barrel temperature.
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, December 17, 2003 6:10 PM
To: sal@advancedburner.com
Cc: Bill Morgan; Jim Knapp; James Nelson; Phil Hailes
Subject: IPP Burner TC's Type E

Sal,
I understand you are supplying 2 thermocouples on each new burner.
Could you let us know where you plan to locate them?
Just so you know, we currently have type E thermocouples on our existing burners.
We'd appreciate it if you used the same type E, so that we wouldn't need to pull new extension wire back to the data aquisition IO.
Let us know if different.
Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

CC: "'Howard Hamilton'" <howard-h@ipsc.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'James Nelson'" <JIM-N@ipsc.com>, "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 3/2/2004 9:53:30 AM
Subject: RE: IPSC Contract 04-45606

I will be obtaining and providing you daily updates on the JMS work/shipping status.
Sal

-----Original Message-----
From: James Nelson [mailto:JIM-N@ipsc.com]
Sent: Tuesday, March 02, 2004 11:11 AM
To: <"Salvatore Ferrara"; Howard Hamilton
Cc: tarkel@advancedburner.com; Phil Hailes
Subject: Re: IPSC Contract 04-45606

This makes me extremely nervous. We need daily update and confirmation as to ship date of all diffusers with the remaining hardware (ceramic, etc) and we need to coordinate this with TEI asap. There could very well be costs from the installer for holding up his installation plan. These are very late. He already has two rows of burners installed and expect all burners will be in place before the end of the week.

>>> "Salvatore Ferrara" <sal@advancedburner.com> 3/2/2004 8:31:18 AM >>>
Howard,

The first shipment of 12 HFD's were picked up yesterday at the JMS shop
in Latrobe, PA. Attached are the shipping documents. We contacted ABF Freight today and they promised delivery to IPP this Friday by 5:00 PM.

JMS had problems obtaining ceramic materials to complete the work by end
of last week. They have all ceramic on hand now and are expediting completion. I'll let you know later today when the next shipment is expected to be leaving the JMS shop. We'll try to make a shipment each day in order to maintain a steady flow of HFD's to keep your installers
going.

Sal

CC: <tarkel@advancedburner.com>, "'Phil Hailes'" <Phil-H@ipsc.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 4/28/2004 7:56:17 AM
Subject: RE: More ABT burner thermocouple installation difficulties

Jerry,
Attached is quote and drawing revision for factory modification of the thermocouples to return to a self supporting head design. An alternative would be to run rigid conduit in the field that is fixed close to the connection at the head, and have the conduit support the head. This alternative eliminates the need to sent the thermocouple back to the factory however I don't know which is the more cost effective solution.
Sal

-----Original Message-----
From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Tuesday, April 27, 2004 1:34 PM
To: Jerry Finlinson
Cc: tarkel@advancedburner.com; Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: More ABT burner thermocouple installation difficulties

Jerry,
TTEC advised that IPSC requested them to change the length of the thermocouples by adding 2" at the factory. I was not aware that this change was made until my discussion today with TTEC. This length change results in the need for additional support of the terminal head as you have discovered (the assemblies that ABT ordered per drawing 10-4881did not require additional support). I requested that TTEC propose modification to the assembly so that the head is self supported. This will most likely require sending the assemblies back to the TTEC factory.
I asked TTEC to send me their proposal however you can continue to work with them directly if you prefer. Please let me know.
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Tuesday, April 20, 2004 1:28 PM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com; Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: More ABT burner thermocouple installation difficulties

FYI,
We just tried installing the new 1/16 inch diameter thermocouples on the ABT burners.
The thermocouples fit nicely in the existing thermocouple wells.
However, there is a problem
with how the thermocouple head isn't supported.

Notice in the enclosed photo, how the weight
of the thermocouple head is supported only by the thermocouple wire.
Then we also need to
attach a conduit and cable to the head. This will bend down the

thermcouple wire and
probably break it eventually. We need to come up with a better attachment or support for
the thermocouple head.

Because the thermocouple is brazed into the fitting it's difficult to replace these fittings
with a nipple that could support the weight. Would we be able to weld the steel and brass
fittings together. Any suggestions?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/27/2004 9:54:01 AM >>>
Jerry,
I ordered 96 replacement thermocouples. They will be 1/16" diameter, simplex type, as shown on attached sketch 10-4881. The shop made a mockup of the tube run and tried a 1/8" diameter thermocouple and it was
still very difficult to insert. The 1/16 diameter type inserts easily. We have to go to compression type (spring loaded type doesn't come in 1/16" diameter). The compression fitting will provide adjustability to insure the tip is inserted fully and bottoms out at end of tube. Delivery is being expedited however material takes 2 weeks to acquire. The promised delivery is four weeks (by 4/2/04).
Regards,
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, February 25, 2004 9:57 AM
To: sal@advancedburner.com
Cc: Howard Hamilton; Howard Scott; James Nelson; John Fritzges; Phil Hailes
Subject: RE: ABT burner thermocouple installation difficulties

Sal,
I had my I&C supervisors go out with me to attempt to put the thermocouples into the wells.
With much struggle and grabbing them with pliers we were able to get the short one in.
We are nervous about damaging the thermocouple sheath.

We also got a 1/8 inch diameter copper rod and inserted it in, it went easier, but was still twisted
up. You should specify that the bend radius should not be less that

10
to 12 inches. In the case of the short
thermocouple is a bend even necessary? Couldn't the thermowell just
be
angled down to the spot where it is welded on?

We think at this point that it would be best to switch all the
thermocouples to 1/8 inch diameter.
Can that be done in the time frame? You can have your guy take a look
at it when he is here tomorrow.

We are worried that it's such a struggle to get the 3/16 diameter ones
in the pipe that it will
be nearly impossible to get them out again. We also don't want to use
organic lubricant because
it will carbonize in service and make it difficult to reinstall
another
thermocouple.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Salvatore Ferrara" <sal@advancedburner.com> 2/23/2004 3:02:08 PM
>>>

Jerry,
Per my discussion with the PCW fab shop, tubes were bent with 4"
centerline radius die. In discussion with the thermocouple supplier,
the
.312" tube ID with 4" radius bends is sufficient for the .187"
diameter
thermocouple to pass thru. Our experience with the TC's is they are
pretty flexible however they don't just slide in. It takes a little
effort to work the TC through the tube but our experience is that they
will work through. Twisting, by holding onto the 3/16 sheath at the
same
time you're pushing in normally helps (just be careful not to twist
the
head portion of the TC assembly).
Let me know how this works.
Sal

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Friday, February 20, 2004 3:51 PM
To: sal@advancedburner.com

Cc: Howard Hamilton; Howard Scott; Jim Knapp; James Nelson; John Fritzges; Phil Hailes
Subject: ABT burner thermocouple installation difficulties

FYI,
Yesterday, I took one of the thermocouples out and tried sliding it down the thermowells that are installed in the burner.
It would only slide in about 13 inches before hitting a tight bend in the thermowell. Apparently your installers are making some sharp corner
bends on the thermowell that's making it very difficult to insert.

Have you tried inserting one?
The type E thermocouples that we have are 3/16 inch diameter and don't bend so easy.

Maybe we'll need to get some 1/8 inch diameter thermocouples.

I noticed that there are some sharp bends on the thermocouiple out near
the tip as well.
The bends are only 10 to 15 degrees, but they have a sharp corner, it would have been better to make it very gradual, then the thermocouple would slide in easily.

Please advise on your recommended solution.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

CC: <tarkel@advancedburner.com>, "Howard Hamilton" <howard-h@ipsc.com>, "Howard Scott" <HOWARD-S@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>, "John Fritzges" <JOHN-F@ipsc.com>, "Phil Hailes" <Phil-H@ipsc.com>

From: "Sal Ferrara" <sal@advancedburner.com>
To: "Howard Hamilton" <howard-h@ipsc.com>
Date: 6/1/2004 11:33:04 AM
Subject: RE: Turning Vane Details

Howard,
We are behind on completing the details. I expect these will be complete in 2 weeks (by 6/18/04).
Sal

-----Original Message-----
From: Sal Ferrara [mailto:sal@advancedburner.com]
Sent: Tuesday, May 04, 2004 2:00 PM
To: Howard Hamilton
Cc: Alan Paschedag; Phil Hailes; James Nelson
Subject: RE: Turning Vane Details

Howard,
We are planning to have these details complete by June 1, 2004. I'll let you know if there is any change in this schedule.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Tuesday, May 04, 2004 11:10 AM
To: sal@advancedburner.com
Cc: James Nelson; Phil Hailes
Subject: Turning Vane Details

I have not heard back from you concerning a schedule to have the detail drawings for the turning vanes, division walls and straightening plates for the secondary air duct and the windboxes.

When do you plan to release these drawings?

CC: "Alan Paschedag" <alan@advancedburner.com>, "Phil Hailes" <Phil-H@ipsc.com>, "James Nelson" <JIM-N@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/9/2004 8:03:12 AM
Subject: RE: Welding Clarification

Howard,
Stitch welding these components is in accordance with our design requirements. Some may be stitch welded on either the outside or the inside. The welds you called "spot welds" are actually "tack welds" that are just done to line up the parts during fabrication, then later stitch welded either on the inside or outside.
There is no reason, performance or mechanical, that the components be fully welded.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Friday, February 06, 2004 7:15 PM
To: sal@advancedburner.com
Cc: James Nelson; Phil Hailes
Subject: Welding Clarification

Attached photo shown stitch welding of the burner throat.

Our question is why these burner throat seams were stitch welded and not fully welded for their entire length. In fact the the two shroud welds are spot welded.

CC: "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>

From: "Salvatore Ferrara" <sal@advancedburner.com>
To: "'Howard Hamilton'" <howard-h@ipsc.com>
Date: 2/19/2004 8:14:47 AM
Subject: RE: Tack welding of ABT Burner Throats

Howard,
The stitch weld on the inside is all that we originally required of our foundry that assembled the throat castings. The first assemblies completed had more welding than we required. We advised the foundry of this and they reduced the welding to our original requirement by the last assemblies. Either way, the welding is acceptable.
Sal

-----Original Message-----
From: Howard Hamilton [mailto:howard-h@ipsc.com]
Sent: Wednesday, February 18, 2004 12:02 PM
To: sal@advancedburner.com
Cc: tarkel@advancedburner.com; James Nelson; Phil Hailes; ssteede@teiservices.com
Subject: Tack welding of ABT Burner Throats

Please advise concerning the following.

The attached photos show that CCW 12, CCW 17 and CCW 09 were received with only a tack weld on the outer burner throat longitudinal seams.

This is the first burners to have been fabricated this way.

The burners started out with a full penetration weld ground smooth inside and out, then this evolved into a stitch weld inside and out and now we have a stitch weld inside and a tack weld outside.

CC: <tarkel@advancedburner.com>, "'James Nelson'" <JIM-N@ipsc.com>, "'Phil Hailes'" <Phil-H@ipsc.com>, <ssteede@teiservices.com>

ABF FREIGHT

24-011-05
3-5-04

TO: Consignee: INTERMOUNTAIN GENERATING STATION
Street: 850 WEST BRUSH WELLMAN ROAD
Destination: DELTA, UTAH   Zip Code 84624
Route: ATTN: JAMES NELSON

FROM: Shipper: JMS FABRICATED SYSTEMS
Street: 201 HILLVIEW AVENUE
Origin: LATROBE PA   Zip Code 15650
Vehicle Number
EMERGENCY RESPONSE PHONE NO.

No. Shipping Units	HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	Rate	CHARGES (for Carrier use only)
2 SKIDS		CERAMIC LINED STEEL	1300#	50	

CONTRACT # 04-456006
CALL 24 HOURS PRIOR TO DELIVERY
DELIVERY M-S 7:00 A.M - 5:00 P.M.
A.B.T. A03-008-417
PHONE # 435-864-6670

ABF TIME SAVER QUOTE # SY63100654

ABF
310 214 052
CODE

Driver signature only acknowledges receipt of freight. Shipment is subject to applicable terms and conditions of Uniform Straight Bill of Lading and ABF's tariffs. 6

REMIT C.O.D. TO:
ADDRESS

COD Amt $

C.O.D. FEE PREPAID COLLECT
TOTAL CHARGES $
FREIGHT CHARGES
Check Appropriate Box:
Freight prepaid / Collect

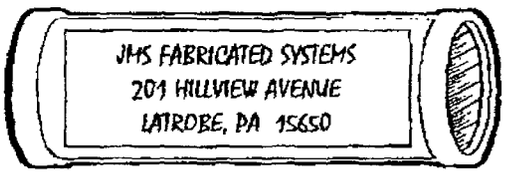
[illegible fine print]

SHIPPER   CARRIER ABF 3/5/04 2-Skids
PER James [signature]   PER   DATE
Permanent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
For further details on SHIPPING HAZARDOUS MATERIALS see Federal Regulations 49 CFR, Part 172.

1

TOPS FORM No. 3846 Made in U.S.A.



PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/05/04

SHIP TO: Intermountain Generating Station
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: ABF Freight – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	02	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A02-D0.
	Quantity Back Ordered = 28	

350 New Street
Quakertown, Pa. 18951
Phone: 215 529-9394
Fax: 215 529-9397
www.tteconline.com

THERMOCOUPLE TECHNOLOGY, INC.

Fax

To: ADVANCED BURNER TECHNOLOGY / SAL

From: Ed Maile

Fax: 908-470-0479 **Pages:2**

Phone: 908-470-0479 **Date:** 27 April 2004

Re: TYPE E THERMOCOUPLES **CC:** BILL BIERNE

☐ **Urgent** X **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

GOOD AFTERNOON SAL,

48 PCS	T-TEC # 10-4881REV.2-1 (MODIFY T/C'S *)	$53.25 NET/EA
48 PCS	T-TEC # 10-4881REV.2-2 (MODIFY T/C'S *)	$53.25 NET/EA

*TO ADD 1/4" X 6" SUPPORT TUBE TO EXISTING THERMOCOUPLES.

PLEASE VERIFY 1/4" O.D. SUPPORT TUBE LENGTH OF 6" IS ACCEPTABLE. COMPRESSION FITTING IS ADJUSTABLE ALONG THIS LENGTH.

SHIPMENT: 5 - 7 WORKING DAYS AFTER RECEIPT OF RETURNED THERMOCOUPLES.

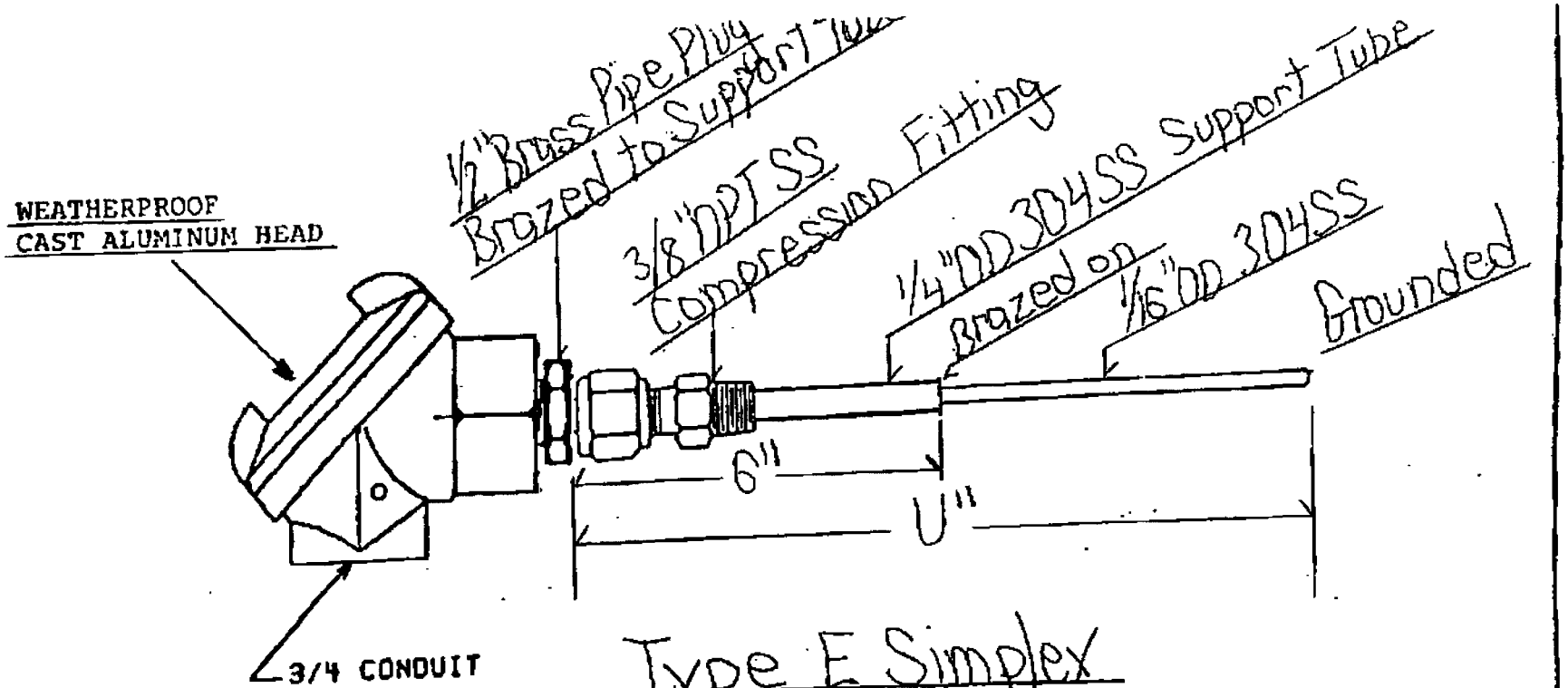
PLEASE REF OUR QUOTATION # I0427EM3

THANK YOU

HAVE A GOOD NIGHT

ED

**** VISA, MASTERCARD & AMERICAN EXPRESS ACCEPTED****



Type E Simplex
With Compression
Fitting Loose

Item	U" Length
1	62 1/4"
2	105 9/16"

Rev.	Date	Change
Rev.1	3/17/04	Added 2" to Both Items
Rev.2	4/2/04	Added 1/4" OD x .5" Sleeve to Cold End

Thermocouple Technology, Inc.
350 New Street
Quakertown, PA 18951
Phone: 215-529-9394 Fax: 215-529-9397 www.tcconline.com

Date: 2/26/04 | Drawn by: EM | Approved by:

Scale: -n-

Type E Simplex Thermocouple

Drawing Number 10-4881 Rev.2

PICK TICKET

THERMOCOUPLE TECHNOLOGY, INC.
350 NEW STREET • QUAKERTOWN, PA 18951
(215) 529-9394 • FAX (215) 529-9397

ORDER NO.	ORDER DATE	CUST. NO.	CUST. P.O.	JOB NO.	PAGE NO.
007555	02/27/04	PRIB	A03008416		1

SHIP VIA/TERMS	SHIP DATE REQ. COM	SHIPPING INSTRUCTIONS	WAREHOUSE LOCATION
UPS GROUND	03/26/04		01
NET 30	Ppd		T-TEC

SOLD TO
PRO-QUIP, INC
505 LEXINGTON AVENUE
CLIFTON, NJ 07011

SHIP TO
ADVANCED BURNER TECHNOLOGY
C/O INTERMOUNTAIN GEN. STN.
850 W. BRUSH WELLMAN RD
DELTA, UT 84624

QUANTITY ORDERED	REQUEST DATE	ITEM NO. / DESCRIPTION	PICK SEQUENCE	UOM	QUANTITY TO SHIP	QUANTITY PICKED
		******* Warning: Duplicate Pick Ticket *******				
48.000	03/26/04	099-002502 10-4881-REV1-1		EA	48.000	48
48.000	03/26/04	099-002503 10-4881-REV1-2		EA	48.000	48

Attn: Sal
4 Boxes
tracking #'s
1Z2674600310039165
39183
39209
39227
shipped 3/30/04

	INITIAL	EIN	DATE
IC			
TECH	CC [illegible]		3/30/04
QA	[illegible]		3/30/04
SHPR			
TDV	$		

[redacted]

MISCELLANEOUS	FREIGHT CHARGES

IP7_030388

PCW
PASSAIC COUNTY WELDERS
Fabricators of Steel and Alloy Products

100 Parish Drive
Wayne, NJ 07470
Tel: (973) 696-1200
FAX: (973) 696-1411

PACKING LIST

9794

TO
Bill to:
Advanced Burner Technologies
271 Rte 202/206
P.O.Box 410
Pluckemin, NJ 07978

FROM
Ship to:
Intermountain Gen. Station
850 West Brush Wellman Road
Delta, UT 84624

SHIP VIA	FOB	TERMS	SHOP ORDER NO.
pacer		NET 30 DAYS	21362

ORDER DATE	REQUIRED DATE	CUSTOMER NO.	INSTRUCTIONS	PAGE NO.
03/07/04	03/10/04	A03-008-410		1

QUANTITY	UNIT	PART NO./DESCRIPTION	UNIT PRICE	AMOUNT
1		IPSC Misc Steel as follows: 1 fabricated channel 39" long 12 4' x 10' sheets of 11GA HRS Plate 105 3" channel x 4.1#/ft x 40' A36 13 5" channel x 6.7#/ft x 40' A36		

Pacer driver picked up on 3-10-04 Initial sign paperwork

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

J Demarest PCW

/// SHIPPED ON 3/10/04 \\\

Signature X _____

IP7_030389

ABF FREIGHT

24-011-3
3-2-04

TO: Consignee: INTERMOUNTAIN GENERATING STATION

Street: 850 WEST BRUSH WELLMAN ROAD

Destination: DELTA, UTAH Zip Code 84624

ATTN: JAMES NELSON

FROM: Shipper: JMS FABRICATED SYSTEMS

Street: 201 HILLVIEW AVENUE

Origin: LATROBE PA 15650

No. Shipping Units	HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight	Rate	Charges
2 SKIDS		CERAMIC LINED STEEL	1,300#	50	

CONTRACT # 04-45666
CALL 24 HOURS PRIOR TO DELIVERIES
DELIVERY M-S 7:00 A.M. - 5:00 P.M.
A.B.T. A03-008-417
PHONE # 435-864-6670

ABF TIME SAVER QUOTE # 4TN3100624

ABF FREIGHT SYSTEM
310 215 649 HP CODE

Driver signature only acknowledges receipt of freight. Shipment is subject to applicable terms and conditions of Uniform Straight Bill of Lading and ABF's tariffs. 0

REMIT C.O.D TO: ADDRESS

COD

X Freight charges...

SHIPPER
PER James [signature] 3/2/04

CARRIER [signature]
PER 3 2 04 DATE

Permanent post office address of shipper

MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS
For further details on SHIPPING HAZARDOUS MATERIALS see Federal Regulations 49 CFR Part 172.

1

TOPS FORM No. 3848

IP7_030390

JMS FABRICATED SYSTEMS
201 HILLVIEW AVENUE
LATROBE, PA 15650

PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/02/04

SHIP TO: Intermountain Generating Station
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: ABF Freight – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	02	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A02-D0.
	Quantity Back Ordered = 34	

ABF FREIGHT

24-011-05
3-5-04

TO: Consignee: INTERMOUNTAIN GENERATION STATION
Street: 850 WEST BRUSH WELLMAN ROAD
Destination: DETA, UTAH Zip Code 84624
Route: ATTN: JAMES NELSON

FROM: Shipper: JMS FABRICATED SYSTEMS
Street: 201 HILLVIEW AVENUE
Origin: LATROBE PA Zip Code 15650
Vehicle Number:
EMERGENCY RESPONSE PHONE NO.

No. Shipping Units	+ HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	Rate	CHARGES (For Carrier Use Only)
2 SKIDS		CERAMIC LINED STEEL	1300#	50	

CONTRACT # 04-456006
CALL 24 HOURS PRIOR TO DELIVERY
DELIVERY M-S 7:00 A.M - 5:00 P.M.
A.B.T. A03-008-417
PHONE # 435-864-6670

ABF TIME SAVER QUOTE # S963100654

ABF Freight System, Inc.
310 214 052
CODE:

Driver signature only acknowledges receipt of freight. Shipment is subject to applicable terms and conditions of Uniform Straight Bill of Lading and ABF's tariffs. 6

REMIT C.O.D. TO:
ADDRESS

COD Amt $

C.O.D. FEE
PREPAID
COLLECT
TOTAL CHARGES $

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement. The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

SHIPPER
PER James
Permanent post office address of shipper

CARRIER Amer ABF 3/5/04 2-SKIDS
PER
DATE

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
For further details on SHIPPING HAZARDOUS MATERIALS see Federal Regulations 49 CFR, Part 172.

1

TOPS | OBM 136 3846 Made in U.S.A.

IP7_030392

JMS FABRICATED SYSTEMS
201 HILLVIEW AVENUE
LATROBE, PA 15650

PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/05/04

SHIP TO: Intermountain Generating Station
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: ABF Freight – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	02	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A0Z-D0.
	Quantity Back Ordered = 28	

ABF FREIGHT

24-MAR-04
3-8-04

Consignee: INTERMOUNTAIN GENERATING STATION
Street: 850 WEST BRUSH WELLMAN ROAD
Destination: DELTA UTAH Zip Code 84624
Route:
ATTN. JAMES NELSON

Shipper: JMS FABRICATED SYSTEMS
Street: 201 HILLVIEW AVENUE
Origin: LATROBE PA Zip Code 15650
Vehicle Number:

No. Shipper Units	HM	Packaging, Description of Articles and Marks and Exceptions	Weight (Subject to Correction)	Rate	CHARGES
10 SKIDS		CERAMIC LINED STEEL	6500#	50	

CONTRACT # 04-456006
CALL 24 HOURS PRIOR TO DEL.
DELIVERY M-S 7:00 A.M. - 5:00 PM
A.B.T. A03-008-417
PHONE # 435-864-6670

ABF Freight System, Inc. Pro No.
310 216 164

ABF TIME SAVER QUOTE # TVP3100684-B

REMIT C.O.D. TO:
ADDRESS

COD Amt. $

C.O.D. Fee
PREPAID
COLLECT
TOTAL CHARGES

FREIGHT CHARGES
Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement. The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of consignor)

Shipper hereby certifies that he is familiar with all the terms and conditions of the bill of lading set forth in the classification or tariff which governs the transportation of this shipment, and such terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.
This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

SHIPPER
PER 3/8/04
Permanent post office address of shipper

CARRIER ABF (10 SK)
PER Scott DATE 3-8

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
For further details on SHIPPING HAZARDOUS MATERIALS see Federal Regulations 49 CFR, Part 172

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IP7_030394

JMS FABRICATED SYSTEMS
201 HILLVIEW AVENUE
LATROBE, PA 15650

PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/08/04

SHIP TO: **Intermountain Generating Station**
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: ABF Freight – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	10	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A02-D0.
	Quantity Back Ordered = 18	

ALTERNATE STRAIGHT BILL OF LADING - SHORT FORM

Original Not Negotiable

Shipper No.

Carrier No. 24-011-07

Date 3-10-04

MERCER TRANSPORTATION
(Name of Carrier)

TO: Consignee INTERMOUNTAIN GENERATING STATION	FROM: Shipper JMS FABRICATED SYSTEMS
Street 850 WEST BRUSH WELLMAN ROAD	Street 201 HILLVIEW AVENUE
Destination DELTA UTAH Zip Code 84624	Origin LATROBE PA Zip Code 15650
Route ATTN: JAMES NELSON	Vehicle Number / EMERGENCY RESPONSE PHONE NO

No Shipping Units	+ HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	Rate	CHARGES (for Carrier use only)
8		SKIDS CERAMIC LINED STEEL	12000#	50	

CONTRACT # 04-456006
CALL 24 HOURS PRIOR TO DELIVERY
DELIVERY M-S 7:00 A.M. - 5:00 P.M.
A.B.T. A03-008-417
PHONE # 435-864-6670

"LOAD MUST BE TARPED"

COD

James M Sell 3/10/04

CASHIER

PER

3-10-04

MARK WITH "X" TO DESIGNATE IF HAZARDOUS MATERIAL ... FEDERAL REGULATIONS

Thursday, March 11, 2004 3:12 PM

IP7_030396

JMS FABRICATED SYSTEMS
201 HILLVIEW AVENUE
LATROBE, PA 15650

PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/10/04

SHIP TO: **Intermountain Generating Station**
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: Mercer Transportation – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	08	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A02-D0.
	Quantity Back Ordered = 10	

ABF FREIGHT 1724-836-6605 24-011-2
3-1-04

TO Consignee INTERMOUNTAIN GENERATING STATION
Street 850 WEST BRUSH WELLMAN ROAD
Destination DELTA UTAH Zip Code 84624
Route ATTN: JAMES NOBLE

FROM: Shipper JMS FABRICATED SYSTEMS
Street 201 HILLVIEW AVENUE
Origin LATROBE PA Zip Code 15650
Vehicle Number
EMERGENCY RESPONSE PHONE NO

No Shipping Units	+ HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	Rate	CHARGES (For Carrier Use Only)
12 SKIDS		CERAMIC LINED STEEL	7800#	50	

CONTRACT # 04-456066
CALL 24 HRS PRIOR TO DELIVERIES
DELIVERY M-S 7:00 A.M. - 5:00 P.M.
A.B.T. # A03-008-417
PHONE # 435-864-6670

ABF VOLUME QUOTE # RH23100614-A

ABF FREIGHT SYSTEM, INC.
310 214 050 CODE

Driver signature only acknowledges receipt of freight. Shipment is subject to applicable terms and conditions of Uniform Straight Bill of Lading and ABF's tariffs. 0

REMIT C.O.D. TO:
ADDRESS

COD Amt: $

C.O.D. FEE
PREPAID $
COLLECT
TOTAL CHARGES $

FREIGHT CHARGES
Check Appropriate Box
Freight prepaid Freight Collect

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules in effect on the date of this Bill of Lading, the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own road or its own water line, otherwise to deliver to another carrier on the route to said destination. It is agreed as to each carrier of all or any portion of said route that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.
This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

SHIPPER
PER 3/1/04
Permanent post office address of shipper

CARRIER ABF 3/1/04 12 SKIDS
PER DATE

MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
For further details on SHIPPING HAZARDOUS MATERIALS see Federal Regulations 49 CFR, Part 172.

1

TOPS FORM [illegible] U.S.A.

IP7_030398

JMS FABRICATED SYSTEMS
201 HILLVIEW AVENUE
LATROBE, PA 15650

PH: 724-537-6365 FAX: 724-537-7281
E-MAIL: jims&jmsind.net

PACKING LIST

JMS Job #24-011
Date: 03/01/04

SHIP TO: **Intermountain Generating Station**
850 West Brush Wellman Road
Delta, Utah 84624
Attn: James Nelson
Contract #04-45606
Intermountain Station Phone:1-435-864-6670

A.B.T. PO #A03-008-417

SHIPPED VIA: ABF Freight – Prepaid & Add

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION
48	12	Opti-Flow Burner Horizontal Fuel Distributor Deflector Assembly per A.B.T. Drawing #03008-500-A02-D0.

IP7_030399